file 3532

INTERNATIONAL TECHNOLOGY CORPORATION

Project No. 303409
August 1992
Revision No. 1

Report

Verification Investigation
Natrium Plant
New Martinsville, West Virginia

Prepared for:

PPG Industries, Inc.
Pittsburgh, Pennsylvania

Prepared by:

IT Corporation
Monroeville, Pennsylvania

Verification Investigation
Natrium Plant
New Martinsville, West Virginia

VERIFICATION INVESTIGATION REPORT
REVISION NO. 1
NATRIUM PLANT
NEW MARTINSVILLE, WEST VIRGINIA

August 6, 1992

Prepared for PPG Industries, Inc.
by IT Corporation

Approved by ______________________ Date 7 AUG 92
Director of Projects

Approved by ______________________ Date 8/7/92
Project Manager

Approved by Joseph M. Burdick Date 8-7-92
Field Manager

Approved by Robert C. Streeter Date 8/7/92
Pittsburgh Quality Assurance Officer

Verification Investigation Report Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

K S Walborn 8/11/92

K. S. Walborn
Manager, Environmental Control

Table of Contents

Table of Contents (continued)

List of Tables

List of Tables (continued)

List of Figures

1.0 Purpose of Investigation

This report contains the results of the Verification Investigation conducted at the PPG Industries, Inc. (PPG), Natrium Plant, New Martinsville, West Virginia, by IT Corporation (IT). The Verification Investigation was conducted in accordance with the requirements set forth in Permit Condition II.B of the U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) Corrective Action and Waste Minimization Permit No. WVD 00 433 6343. This condition of the permit required PPG "to conduct an initial investigation with the objective of verifying whether releases have or have not occurred from seven solid waste management units."

Specifically, PPG was required to develop and implement a groundwater investigation to determine whether further investigation or remediation is warranted based on analysis of groundwater and soil samples for the parameters indicated in Section II.B.1.b(3) of the RCRA permit. The comparison criteria for the parameters are set forth in Section II.B.1.b(4) of the RCRA permit and are hereafter referred to as "criteria." To accomplish this objective, groundwater samples were collected from newly installed and existing monitoring wells strategically located about each of the solid waste management units (SWMU) subject to the Verification Investigation. Similarly, where required, soil samples were also collected from strategically located upgradient and downgradient positions. The seven areas investigated under this Verification Investigation include:

- Marshall Plant Waste Pond (SWMU No. 5)
- Inorganics Waste Pond (SWMU No. 6)
- Barium Waste Landfill (SWMU No. 7)
- Benzene Hexachloride (BHC) Waste Pile (SWMU No. 8)
- Fly Ash Landfill, cells which received barium waste (SWMU No. 10)
- Sanitary Landfill (SWMU No. 11)
- Mercury Wastewater Collection Tanks (SWMU No. 14).

This report presents the field methodology and data acquisition procedures implemented for performance of the Verification Investigation and presents conclusions and recommendations based on the results of the Verification Investigation.

The subsequent chapters of this report are as follows:

- Chapter 2.0 - Background History and Site Conditions
- Chapter 3.0 - Project Investigative Tasks
- Chapter 4.0 - Project Data Analysis
- Chapter 5.0 - Conclusions.

2.0 Background History and Site Conditions

The information presented in this chapter was obtained from a review of file material provided by PPG, Appendix A of the EPA Permit for Corrective Action, site visits conducted by IT on June 2, 1987 and April 13, 1989, and information acquired coincident with the Verification Investigation field activities performed by IT during the period September 11 through October 20, 1989.

2.1 Location

The PPG Natrium Plant facility is located along the eastern bank of the Ohio River approximately 30 miles south of Wheeling, West Virginia and 6 miles north of New Martinsville, West Virginia in Marshall County. The plant is situated on the northern part of the Wells Bottom area, which is comprised of alluvial sediments deposited along a meander on the river. This tract of land is heavily industrialized with Mobay Chemical Company and Air Products and Chemicals, Inc., occupying the remainder of the Wells Bottom area south of the PPG facility. The site is bordered by the Ohio River to the west and steep forested ridges to the east. Figure 1 provides a general map of the facility.

2.2 Environmental Setting

The PPG Natrium Plant is located on floodplain and river terrace features comprised of alluvial deposits. The terraces were developed from Pleistocene glacial outwash deposits that have been downcut by various stages of the Ohio River. The terraces are characterized by coarse sand and silt. Surficial sediments of the lower terraces contain increasing amounts of silt and clay, which probably represent recent floodplain deposits.

There are three primary terrace levels at the PPG facility with elevations averaging 630, 660, and 690 feet above mean sea level (msl). A small localized terrace is present at the site of the closed Mercury Surface Impoundment (Unit 1) at an elevation of approximately 715 feet msl. The terraces are bounded on the east by steep valley walls that rise to an elevation of over 1,300 feet.

The Ohio River is the major surface water body within the immediate vicinity of the facility. A tributary, Sims Run, drains property to the east of PPG and joins the river at the north (upstream) end of the PPG property. This tributary does not receive runoff from facility operations as it is separated from the operations area by a steep bedrock ridge. The latest established 100-year flood level for the region is at an elevation of 641 feet msl. Although the manufacturing area is located outside of the floodplain, four SWMUs (the Fly Ash Landfill, the closed Marshall Plant Waste Pond, the BHC Waste Pile, and the Barium Waste Landfill) are located within the 100-year floodplain (Figure 1). The Ohio River has a mean flow rate of 24,000 cubic feet per second (cfs) and a low flow rate of 5,300 cfs. A downstream lock, the Hannibal Dam, controls the water level and keeps river pool elevations between 620 and 624 feet msl during normal flow periods.

The PPG Natrium Plant utilizes groundwater derived from the alluvial aquifer which underlies the site and is referred to as the Ohio Valley water table aquifer. Sediments within this aquifer exhibit an estimated hydraulic conductivity of 10^{-1} centimeters per second (cm/s) or greater. Previous studies have demonstrated that the natural groundwater flow from the high land in the east toward the Ohio River has been partially intercepted by on-line production wells at the facility. Presently, groundwater flow in the immediate site area is from the river toward the plant property, and flow within the plant boundary is radial under the influence of several centers of pumping (Figure 1).

A detailed discussion of the site geology and hydrogeology as determined from data acquired during the Verification Investigation is provided in Chapter 4.0.

2.3 Climate

The climate within the study area is characterized as humid continental, with an average annual temperature of 54.3 degrees Fahrenheit (°F). January is usually the coldest month (average temperature of 33.1 °F), while July is usually the warmest (average temperature of 75.2 °F). Annual precipitation averages 42 inches per year, with the majority of the total precipitation occurring in the summer months. Snowfall averages 21 inches per season, and the frost-free period usually extends from late April to mid-October.

2.4 History of Relevant SWMUs

The following sections present a description of the past operating practices for each of the SWMUs subject to the Verification Investigation. A tabulation of wastes historically stored at each SWMU is presented in Table 1.

2.4.1 Marshall Plant Waste Pond

PPG purchased the Marshall Plant in May 1969 after first leasing it from the federal government. This facility was originally constructed by and used by the federal government (U.S. Department of Defense) as part of a federal facility and possibly used by other former operators who held leases prior to PPG. The Marshall Plant Waste Pond was apparently built with clay walls and bottom. This unit was used by PPG as a disposal site for waste streams form a chlor-alkali plant, chlorinated benzene plant, and titanium tetrachloride plant.

The general dimensions of the unit are 275 by 220 feet, with a capacity of approximately 18,000 cubic yards (cy). The unit was closed in 1980 with the installation of a 6- to 8-inch-thick soil cover.

Aromatic and aliphatic chlorinated organics may be present in this unit. However, the potential quantity and extent of any possible migration are unknown.

2.4.2 Inorganics Waste Pond

This unit accumulated sludge from a barium process plant from 1962 to 1972. The accumulated sludge was periodically transferred to the Barium Waste Landfill during 1963 and to Cells Nos. 1 and 2 of the Fly Ash Landfill from 1963 to 1972. The unit served as a settling pond for wastewater before the water was discharged through a National Pollutant Discharge Elimination System (NPDES) permitted outfall (No. WV0004359). The pond was constructed of excavated earthen walls and floor; there were no raised dikes and the pond's dimensions were approximately 225 by 140 feet, with a capacity slightly over 7,000 cy. The unit was closed in 1980, refilled to grade with clean soil, and an 8-inch-thick soil and clay cover installed.

2.4.3 Barium Waste Landfill

During 1963, this unit was used to dispose of solid wastes from a barium carbonate/chloride plant. The disposal site was constructed of excavated earthen sides and base. The dimensions of the unit were approximately 200 by 200 feet with a capacity of 5,500 cy. The site was closed in June 1980, capped with a minimum 6-inch-thick soil cover, and seeded.

2.4.4 Benzene Hexachloride Waste Pile

This unit stored BHC isomers and other waste products of the process that produced concentrated BHC. This storage site was constructed in 1952 as an open pile on earthen fill with a capacity of 1,900 cy. The dimensions of the unit were 75 by 150 feet. From 1952 through 1962, approximately 330,000 pounds per year of BHC isomers was stored here. In 1977, solid waste and contaminated soil were removed from this unit and sent to an approved landfill.

2.4.5 Fly Ash Landfill

This unit consists of five separate disposal cells. Two of these cells received barium plant waste from 1963 to 1972, as well as boiler fly ash and bottom ash. Presently, four of the five cells, including the cells that received barium waste, are inactive and have been capped with approximately 6 inches of soil and seeded. The fifth cell is presently accepting ash disposal under West Virginia Water Pollution Permit No. IWL-6313-86. The unit as a whole has received approximately 704,000 tons of ash since 1952.

2.4.6 Sanitary Landfill

This unit is a Class III nonchemical Sanitary Landfill for general trash, rubbish, demolition, and construction refuse operating under an August 16, 1978 West Virginia Department of Health Permit No. 7192. The unit consists of three adjacent disposal sites that are constructed of a sandy-clay loam soil. The unit's dimensions are approximately 1,000 by 500 feet, with a capacity of about 35,000 tons. Nonchemical wastes are collected 5 days per week from approximately 50 dumpster bases located throughout the plant. There are currently 22,000 tons of waste in the landfill.

2.4.7 Mercury Wastewater Collection Tanks

This unit consists of three rubber-lined carbon-steel tanks, with dimensions as follows:

Tank	Dimensions (diameter x height)	Capacity (gallons)
Brine Field Collection Tank	8.0' x 19.5'	7,300
Mercury Cell Collection Tank	14.0' x 20.0'	23,000
Small Sump Collection Tank	7.5' x 4.0'	1,300

Effluents from the Brine Field Collection Tank and the plant's Mercury Cell Collection Tank are pumped to the mercury treatment system. After treatment, the system effluent is gravity fed to the main plant outfall. The third small sump collection tank receives precipitation from the large collection tank area. This runoff is pumped back to the Mercury Cell Collection Tank and then to the treatment system. The units were put into service in 1970, and PPG has no closure date planned for them. The units are enclosed tanks that rest on a paved area with curbing. The Sump Collection Tank is in a concrete sump.

3.0 Project Investigative Tasks

The following is a discussion of the field activities which were performed during the Verification Investigation at the PPG Natrium site. The field program was implemented in accordance with the "Verification Investigation Work Plan, Natrium Plant, New Martinsville, West Virginia, Revision 1," dated July 1989, prepared by IT and the EPA's Work Plan approval letter dated August 10, 1989. The work scope included the installation of strategically located (i.e., upgradient and downgradient) groundwater monitoring wells at each SWMU under investigation, permeability testing of all newly installed monitoring wells, collection and analysis of groundwater and soil samples, and surveying (location and elevation) of all newly installed monitoring wells..

3.1 Monitoring Well Installations

The Verification Investigation at the PPG Natrium Plant included the installation of a total of 21 monitoring wells strategically located about the SWMUs of concern. Monitoring well installation activities occurred during the period September 11 through September 30, 1989. Locations of the newly installed monitoring wells were selected to fulfill the specified requirements of the Verification Investigation Work Plan; specifically, to be able to assess whether migration of hazardous constituents has or has not occurred from each of the SWMUs identified for this investigation. In an effort to provide monitoring wells that were properly positioned about each SWMU with respect to upgradient and downgradient locations, a thorough review of available hydrogeological data was conducted, including the collection of water level data from existing monitoring and pumping wells (April 13, 1989). An updated groundwater contour map was constructed and compared with previous groundwater contour/flow direction maps. Existing monitoring wells were evaluated as to their suitability (i.e., condition and location) for utilization in the Verification Investigation. Because monitoring well placement was specific to each SWMU, all of the following factors were addressed prior to the actual installation of a monitoring well:

- Location and condition of any existing monitoring wells which potentially could be utilized during the Verification Investigation (including screen length and screen position relative to normal groundwater levels).

- Location of pumping wells and their influence, if any, on the selection of upgradient and downgradient monitoring well locations.

- Review of historical hydrogeological data, including a comparison of "wet" and "dry" season groundwater levels and flow directions.

- General well design and placement requirements of both the EPA (as defined in the RCRA Technical Enforcement Guidance Document, September 1986) and the West Virginia Department of Natural Resources (WVDNR).

- Presence of existing cultural features throughout the plant (e.g., railroad tracks, roadways, buildings, etc.) which would interfere with monitoring well placement.

3.1.1 Drilling Methods

As all monitoring wells were installed within unconsolidated alluvial deposits of sand, silty to sandy clay, and gravel, all boreholes drilled during this investigation were advanced through the use of 4.25-inch-inside-diameter (I.D.) hollow-stem augers. All boreholes were advanced to a depth of approximately 15 feet below the depth at which groundwater was initially encountered at each borehole location. Drill cuttings generated at each location during borehole advancement were placed in drums and appropriately labeled as to which monitoring well borehole they were derived from and on what date they were generated and containerized. All drums were eventually moved to an on-site storage area, where soil samples were collected from each drum and analyzed for the constituents of concern at each SWMU. All analytical results from these samples were negative with respect to their respective analytes, with the exception of that soil derived from drill cuttings generated within the vicinity of the BHC Waste Pile (SWMU No. 8). An EP toxicity test performed on the cuttings derived from the boreholes drilled in the vicinity of SWMU No. 8 showed the presence of alpha BHC at a concentration of 1,400.0 parts per billion (ppb) and methylene chloride (CH_2Cl_2) and chloroform ($CHCl_3$) at concentrations of 1.2 ppb and 0.2 ppb, respectively (Table 2). These cuttings have since been disposed of at an approved off-site facility.

During the advancement of boreholes, lithologic samples were collected at 5-foot intervals through the use of standard 2-inch-outside-diameter (O.D.) split-spoon samplers. All Standard Penetration Tests (SPT) were performed in accordance to the specifications outlined in American Society for Testing and Materials (ASTM) Procedure D1586, "Standard Method for Penetration Test and Split-Barrel Sampling of Soils." Upon retrieval of a split-spoon sample, an IT field geologist visually classified the sample using the Unified Soil Classification System (USCS) and recorded the information on a boring log. A total organics vapors monitoring unit (HNU) photoionization meter or equivalent was used to monitor air quality at each borehole location during drilling and sampling activities. Copies of all boring logs prepared by the IT field geologists during the Verification Investigation are presented in Appendix A.

3.1.2 Construction of Monitoring Wells

After a borehole had been advanced to the desired depth (i.e., approximately 15 feet below the level at which groundwater was first encountered), a 2-inch-diameter monitoring well was installed through the hollow-stem augers. Monitoring wells installed during the Verification Investigation were constructed of a 20-foot section of Schedule 40 polyvinyl chloride (PVC) 0.010-inch slot screen and an appropriate length of threaded, flush-jointed Schedule 40 PVC riser pipe in accordance with EPA specifications. The well screens were intended to be set such that the water table surface would be intercepted during both wet and dry seasons (e.g., an allowance was provided for seasonal variances and changes in pumping rates). As the monitoring wells were installed during the dry season, an additional 5 feet of screen was installed above the water table as it existed during the time of well construction. As-built monitoring well construction diagrams are provided in Appendix B. The remainder of the monitoring well installation proceeded as follows:

- Backfilling of the borehole, if necessary, with clean sand to the desired depth of the bottom of the well screen (i.e., in some locations, boreholes which were intentionally overdrilled to compensate for the effects of "heaving," sands did not "heave" as much as expected); this was necessary at the boreholes drilled for the following monitoring wells: MW-106, MW-107, and MW-115. Boreholes for Monitoring Wells MW-102, MW-109, MW-111, and MW-116 were also overdrilled; however, the base of the well screen was placed on natural material which had heaved into the borehole.

- Emplacement of clean, coarse, quartz sand (i.e., filter pack) within the annulus between the well screen and the borehole wall to a depth approximately 2 feet above the top of the well screen to form the well sensing zone; the sand was steadily trickled through the hollow-stem augers as they were gently pulled to the surface, thereby eliminating the introduction of undesirable fine-grained sediments (associated with natural borehole collapse) into the filter pack.

  To document that the sand utilized to construct the artificial filter pack was within the recommended D10 range (ten percent passing line of a grain-size analysis curve) for use around a 0.010-inch slot well screen (ASTM D 5092-90), a sample of the filter pack sand was submitted to a geotechnical laboratory for a grain-size analysis. The D10 derived for this sample was 0.47 millimeters (mm), which is within the ASTM recommended range of 0.4 mm to 0.5 mm. Results of the grain-size analysis may be found in Appendix C.

- Sealing of the well sensing zone with a minimum of 2 feet of bentonite pellets (the pellets were emplaced in the same manner as was the filter pack). As the pellets were installed above the saturated zone, they were manually hydrated with potable water to permit proper expansion.

  It should be noted that for Monitoring Well MW-111, the bentonite pellet seal was reduced to a thickness of 1.5 feet in order to permit the secure installation of a surface flush mount assembly. The reduction in thickness of the bentonite pellet seal at this location is not expected to negatively impact the integrity of the monitoring well due to the relatively shallow depth at which the bentonite seal was emplaced (e.g., 1.5 to 3.0 feet below ground surface) and the lack of a water-bearing zone above the bentonite seal (i.e., no threat of hydraulic connection between two water-bearing zones).

- Grouting of the remainder of the well annulus with a cement/bentonite grout to just below the frost line through the use of a tremie pipe.

- Installation of a locking protective steel casing cemented around the top of the riser pipe followed by the emplacement of a 4-inch-thick, 3-foot-diameter concrete apron. Lockable, watertight, surface flush mounts were installed in place of the protective steel casing on three of the monitoring wells (MW-111, MW-119, and MW-120), as they were situated in high-traffic areas.

- Installation of protective bumper pipes around all monitoring wells which extended above the ground surface. All bumper pipes and surface protective casings were painted high-visibility yellow; appropriate identification numbers were painted on each well.

Although the RCRA Groundwater Monitoring Technical Enforcement Guidance Document suggests using Teflon™ or stainless steel for the monitoring well screen, PVC well screen was used for all monitoring wells installed during the Verification Investigation. As stated in the Work Plan, substances which may be detrimental to PVC (e.g., aromatic hydrocarbons) had only been detected at concentrations which would have no effect on the PVC, thereby permitting its use in the construction of monitoring wells at the PPG Natrium Plant. In accordance with the rationale discussed in the Work Plan, only the uppermost portion of the alluvial aquifer was screened during the Verification Investigation. Locations of all monitoring wells installed during the Verification Investigation as well as existing monitoring wells are shown in Figure 1.

3.1.3 Monitoring Well Development

After the grout used to seal the annular space in each monitoring well was permitted to set a minimum of 24 hours, each newly installed monitoring well was developed using a "Well Wizard" air ejector pump. The pump was operated in an intermittent manner to permit flow reversals and surges within the monitoring well sensing zone, thereby eliminating the possibility of bridging of particles against the well screen. Each well was pumped until a sample of ejected water, when placed in a clear glass container, did not contain any visible solids. All water discharged during the development process was collected in 55-gallon drums which were appropriately labeled and identified. The drums were moved to an on-site staging area until the chemical analyses of samples collected from that well were available. At that time, the drummed water was disposed of in a manner dictated by the groundwater quality data (i.e., either disposed of on site or sent to an off-site licensed disposal facility).

Although it was intended that water levels be measured immediately before and after development of each well (as well as 24 hours after development), recharge to the wells was almost instantaneous, thereby preventing the collection of representative data. In most cases, all wells recharged to their original static water level within minutes. Recharge data were recorded during the permeability testing phase of the Verification Investigation (Section 3.2), however, and a complete set of groundwater level data of all new and existing wells was collected within a 10-hour period at the time of groundwater sampling (Section 3.4.1).

3.1.4 Decontamination Activities

All drilling equipment used during the Verification Investigation was decontaminated with a high-pressure steam cleaner prior to drilling the first borehole and between successive boreholes thereafter. Water used in the decontamination process was obtained from an on-site potable water source. All downhole drilling equipment (e.g., bits, augers, rods, etc.) were further decontaminated between boreholes by a methanol rinse followed by a rinse with distilled water.

Although the original Work Plan stated that hexane was to be used in the decontamination process, methanol was substituted due to the tendency of hexane to be present as a laboratory contaminant in the analytical results. This substitution was verbally authorized by Ms. Mary F. Beck, EPA Region III, on September 13, 1989. A letter confirming this authorization was prepared by Mr. Kenneth S. Walborn of PPG and sent to Ms. Beck on September 14, 1989.

Split-spoon samplers were decontaminated between each use directly at the borehole site. The decontamination procedure for split spoons consisted of:

- Scrub-off of visible debris with soapy water (Alconox)
- Rinse in potable water
- Rinse with methanol
- Rinse with distilled water.

Additionally, the monitoring well riser pipe and well screen were steam cleaned prior to insertion into a borehole. This removed cutting oils, greases, and wax from the well construction materials. Similarly, materials used in the well development process (e.g., pump and tubing) were also steam cleaned between use in each borehole to further prevent cross contamination.

Water used at the borehole site for decontamination purposes was returned to the primary decontamination area, which consisted of a polyethylene-lined trough. Water and soil generated during the decontamination process were routinely pumped and shoveled into drums and staged at a central location. These wastes were disposed of as previously described for the drill cuttings (Section 3.1.1) and the development water (Section 3.1.3).

3.2 Permeability Testing

Hydraulic conductivity testing of the newly installed monitoring wells was performed on October 10, 1989. The test method used was a falling-head slug test, with changes in water level noted through the use of an electronic recorder. A falling-head slug test consists of measuring the time necessary for a well to recover to its original static water level after a change in the water level has been induced through the introduction of a slug. Time and water level measurements were recorded by an electronic instrument (e.g., Hermit datalogger). Slugs used in the tests were constructed of 1-inch-O.D. stainless steel (4.99 feet and 7.36 feet in length) and were lowered into the monitoring wells by a section of polypropylene rope.

Prior to conducting the test, the water level in each well was determined using an electronic water level meter. The water level data along with well construction data were used to determine the length of the slug that could be used to conduct the test, depth to which the slug should be dropped, and the desired depth of placement of the pressure transducer which measured the change in water level during the test. After the pressure transducer was placed in the well and the water level in the well was permitted to stabilize, the Hermit datalogger was programmed with the specific data for the well and the test initiated by simultaneously starting the Hermit and dropping the slug into the water. The data recorded by the Hermit datalogger were observed by the operator, and the test was concluded when the water level in the well was within 0.02 foot of the initial static water level. The data were then reviewed by the operator for completeness and stored in the Hermit datalogger's internal memory. At the end of the day, the field data were transferred to a portable computer and stored on a disk. Analysis of the field data was completed upon return to the office. The results of the conductivity testing are discussed in Section 4.1.

3.3 Survey of Monitoring Wells

The 21 monitoring wells installed as part of the Verification Investigation at the PPG Natrium Plant were surveyed on October 20, 1989 by a licensed surveyor. Each newly installed monitoring well was surveyed to establish horizontal well location (e.g., map coordinates), elevation at top of PVC riser, elevation at top of protective surface casing (if applicable), and ground surface elevation at each well location. Horizontal and vertical readings were electronically calculated to 0.001 foot and recorded by a theodolite. Map coordinates were determined using the plant coordinate system (Table 3). The survey data were converted to Universal Transverse Mercator (UTM) coordinates, the accepted system used by the U.S. Coastal and Geologic Survey, by the surveyor, based on information supplied by PPG (Table 4). The locations of all newly installed monitoring wells, existing monitoring wells, and existing pumping wells have been plotted on a base map which utilizes the plant coordinate system (Figure 1).

3.4 Groundwater and Soil Quality Sampling

The Verification Investigation groundwater monitoring task was initiated on October 16, 1989. Groundwater samples were collected from the 21 newly installed monitoring wells (identified as MW-100 through MW-120) and from two existing monitoring wells (MW-5 and MW-32). Two additional existing monitoring wells (MW-10 and MW-16) were originally scheduled to be sampled during the Verification Investigation. However, these wells were found to be internally damaged and could not yield representative samples. In addition to the collection of groundwater samples, this task included the recording of water level data from all newly installed and existing monitoring wells within one 10-hour period. This information is presented in Table 5 and was used in the preparation of the groundwater contour map (Figure 1).

In accordance with the revised Verification Investigation Work Plan, nine soil samples were collected from biased sampling locations (with respect to topography, piping systems, tank bottoms, etc.) within the immediate vicinity of SWMU No. 14 (Mercury Wastewater Collection Tanks). These samples were collected on September 20, 21, 22, and 26, 1989 and were analyzed at the laboratory for the presence of mercury.

3.4.1 Groundwater Sampling Procedures

Immediately upon opening a monitoring well to be sampled, the well headspace was monitored for the presence of organic vapors with a Photovac TIP III. The static water level and the depth to the bottom of the well were then measured to the nearest 0.01 foot using an electronic water level meter (e.g., M-scope). The M-scope was decontaminated between sampling locations by a distilled water-methanol-distilled water rinse. The height of standing water within the well was then determined, and the volume of water to be purged from the well was calculated.

A minimum of three well volumes was removed from each monitoring well prior to sample collection, as suggested by the "RCRA Groundwater Monitoring Technical Enforcement Guidance Document," September 1986, for high yielding wells. All monitoring wells were purged from the top of the water column through the use of a Teflon bailer, which was decontaminated between monitoring wells in accordance with the methodology described in Section 3.1.4. New nylon bailing cord was used at each well location. All monitoring wells purged during the Verification Investigation experienced rapid, if not immediate, recovery.

Groundwater samples were collected with a Teflon bailer equipped with double-check valves and a bottom-emptying device (petcock-type assembly). Although nondedicated bailers were utilized for sample collection, each bailer was disassembled and decontaminated (per the procedure outlined in Section 3.1.4) between sampling events. New nylon cord was used at every well sampled to further minimize the potential for cross contamination between any of the wells. Where applicable, samples for volatile organics were collected first, with the samples containerized in EPA-approved 40-milliliter (mℓ) vials with Teflon-lined silicone rubber septa. An aliquot of sample to be utilized for the field measurement of time-sensitive physical parameters (e.g., temperature, pH, and conductivity) was collected next. Physical parameters were measured in the field using a conductivity meter, thermometer, and pH paper. Groundwater sampling continued at each well location utilizing the following collection hierarchy:

- Semivolatiles
- Total organic carbon (TOC)
- Total organic halogen (TOX)
- Total metals.

All samples were containerized in the appropriate EPA-approved sample bottles and immediately placed in an ice chest to maintain a temperature of approximately 4 degrees Celsius (°C) while en route (via overnight delivery) to the laboratory.

To check on sample handling and the thoroughness of field equipment decontamination, three types of quality control samples were routinely collected. A trip blank, which consisted of a deionized water sample prepared in the laboratory, accompanied the sample containers to the field and back to the laboratory to monitor for possible sample contamination which may have occurred while the sample bottles were en route to and from the laboratory. One trip blank was analyzed during this sampling event as recommended in the "RCRA Groundwater Monitoring Technical Enforcement Guidance Document," September 1986. Field blanks were prepared for each day that samples were collected to monitor the effectiveness of the field decontamination procedures. Field blanks were prepared by filling a decontaminated, nondedicated, Teflon bailer with distilled water and then transferring the distilled water from the bailer to the respective sample bottles. Field blanks accompanied each day's sample shipment. The third type of sample collected for quality control purposes was a duplicate. Duplicate samples were collected at two locations and were assigned different sample identification numbers than the original samples. Duplicate samples were utilized to determine the precision of the analytical method for the sample matrix.

3.4.2 Soil Sampling Procedures

During the advancement of the three boreholes for the installation of monitoring wells at SWMU No. 14 (Mercury Wastewater Collection Tanks), soil samples were collected at depths of 6 to 12 inches below ground surface and at a depth expected to be just above the water table. Soil samples were collected with a split-spoon sampler as described in Section 3.1.1. Since selected samples from these boreholes were to be submitted to the laboratory and analyzed for mercury, the split-spoon samplers were decontaminated between each use to prevent cross contamination between sample intervals. The methodology used in the decontamination of split-spoon samplers is discussed in Section 3.1.4.

Upon arrival at the desired interval, a sample of the soil from that interval was collected and placed into a clean glass container which was labeled with the following information: project name and number, sample location, sample identification number, depth interval, date of collection, and name of individual collecting the sample. Immediately after collection, the samples were placed in an ice chest and cooled to a temperature of approximately 4°C.

In addition to the collection of soil samples from borings, three additional, strategically located soil samples were collected in the immediate vicinity of the wastewater collection tanks. Two of the samples (designated as SS-1 and SS-2) were collected at points which were topographically low with respect to the tank bottoms, while the third sample (identified as SS-3) was collected from a point which was topographically upgradient from the collection tanks. These surface soil samples were collected from depths of 6 to 12 inches below ground surface after an approximate 6- to 8-inch layer of gravel had been scraped away. Samples were collected with a decontaminated stainless steel spoon and placed in clean glass jars which were appropriately labeled. The samples were then placed in an ice chest and prepared for shipment as described above.

Locations where soil samples were collected are shown in Figure 2. Table 6 presents a summary of the soil sample identifications and the respective depths at which the samples were collected.

3.4.3 Sample Shipment

Immediately after collection, groundwater and soil samples were placed in ice chests to maintain a temperature of approximately 4°C while en route to the laboratory. The samples were properly packed to minimize the chance of any breakage. Chain-of-Custody Records and Request for Analysis Forms were placed in each cooler, and the cooler was sealed and labeled in accordance with U.S. Department of Transportation (DOT) and EPA regulations.

Depending on the circumstances (i.e., whether or not IT personnel were returning to the Pittsburgh area) samples were either hand-delivered to the laboratory by a sample team member or shipped for next day delivery by overnight courier. The laboratory was informed in advance that samples would be arriving, and, once received, were instructed to sign off on the Chain-of-Custody Records which were subsequently placed in the project file after final sample disposition.

3.4.4 Laboratory Analysis

Upon arrival at the IT laboratory in Export, Pennsylvania, the samples were inspected by the sample custodian for any damage which may have occurred during transit and to verify that the appropriate temperature had been maintained. Chain-of-Custody Records were completed and the samples were logged and reviewed for holding time limitations for the respective analyses to be performed. While awaiting processing, samples were stored at 4°C.

Groundwater and soil samples were analyzed for the compounds required under Section II.B.1.b(3) of the facility's RCRA permit. As presented in Table 7, specific parameters were to be analyzed for at each SWMU. The analytical detection limits (Table 8) were intended to correspond with the criteria as set forth in Section II.B.1.b(4) of the permit. Due to elevated concentrations of certain parameters in several samples which were detected above the linear range of the gas chromatograph/mass spectrometer (GC/MS), those samples had to be diluted so that they would fall within the instrument's linear range. Consequently, the dilution process elevated the quantitation limits of those parameters which may have been present at very low or nondetect levels. As will be discussed in Chapter 4.0 of this report, the inability to meet certain analytical detection limits in all instances was not critical in the final interpretation of the data.

All sample analyses were performed in accordance with accepted EPA analytical protocol (Table 9). All of the quality assurance/quality control (QA/QC) requirements were adhered to as defined in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" SW-846 and the quality assurance project plan (QAPP). This included the analysis of an appropriate number of method blanks, trip blanks, duplicates, surrogate spikes, and matrix spikes with the samples.

4.0 Project Data Analysis

This chapter of the Verification Investigation report presents a summary of the hydrogeology of the PPG Natrium Plant as interpreted from the boring logs, aquifer test results, and groundwater level measurements. Also presented in this chapter are the analytical results obtained from the groundwater and soil samples collected during the Verification Investigation.

4.1 Hydrogeological Setting

The PPG Natrium Plant is located on floodplain and river terrace features comprised of alluvial deposits. The river terraces have been developed from Pleistocene glacial outwash deposits which have subsequently been downcut by various stages of the Ohio River. The terraces are characterized by coarse sand and silt. Surficial sediments of the lower terrace features contain increasing amounts of silt and clay, which most likely represent floodplain deposits associated with the recent history of the Ohio River. Groundwater movement beneath the facility is strongly influenced by the production wells which operate throughout the plant and by the Ohio River, which borders the plant to the west.

Aquifer testing was performed on the 21 newly installed monitoring wells on October 9 and 10, 1989. As discussed in Section 3.2 of this report, a falling-head test was used to determine the formation hydraulic conductivity at each monitoring well location. Hydraulic conductivity data derived from these tests are presented in Table 10.

The predominant groundwater flow directions at the PPG site are from the east and west toward the center of the plant and are controlled by the production wells. The steep groundwater gradient evident along the bank of the Ohio River (Figure 1) is attributable to the fine, low permeability material found within the area, as noted during the installation of the monitoring wells.

The local hydrogeology in the immediate vicinity of the seven SWMUs subject to the Verification Investigation is presented below.

4.1.1 Sanitary Landfill Hydrogeology

The Sanitary Landfill is the northernmost SWMU at the PPG Natrium Plant. As revealed in the boring log prepared during the installation of Monitoring Well MW-117, the subsurface at this SWMU trends from firm silt to sandy silt, becoming coarser with depth. Groundwater was encountered at approximately 40 feet below ground surface at this location. Below the depth at which groundwater was encountered, the subsurface material was comprised entirely of loose-to-medium dense, coarse sand and gravel. The hydraulic conductivity calculated from the field permeability falling-head test conducted in Monitoring Well MW-117 was 9.1×10^{-3} cm/s, which correlates well with the subsurface geologic description. The groundwater gradient in the immediate vicinity of the Sanitary Landfill is slight, but is indicative of a southerly flow direction toward the nearby plant production wells.

4.1.2 Fly Ash Landfill Hydrogeology

The Fly Ash Landfill SWMU is situated in the northwestern corner of the PPG facility along the Ohio River. The five new monitoring wells completed around this SWMU (MW-112, MW-113, MW-114, MW-115, and MW-116) reveal the presence of fine geologic material such as silty clay, clayey silt, silty sand, and fine sand near the Ohio River which trends to coarser material further inland. This variation in the hydrostratigraphic unit is related to and dependent on the history of the Ohio River. As presented in Table 9, the hydraulic conductivities obtained at these monitoring wells range from 1.1×10^{-3} cm/s to 7.0×10^{-5} cm/s, which is considered to be consistent with the geologic descriptions. The local groundwater gradient is steep, on the order of 0.03 foot/foot (ft/ft) to 0.04 ft/ft and is indicative of a predominant groundwater flow direction from west to east, from the Ohio River to the production well system.

4.1.3 Marshall Plant Waste Pond Hydrogeology

The Marshall Plant Waste Pond SWMU is located immediately south of the Fly Ash Landfill. From a geologic and hydrogeologic point of view, the subsurface is almost identical to the subsurface beneath the Fly Ash Landfill: fine materials (silty clay and silty fine sand) near the Ohio River with coarser material inland. Calculated hydraulic conductivities from monitoring wells installed around this SWMU (MW-100, MW-101, and MW-102) range from 7.8×10^{-3} cm/s to 1.9×10^{-5} cm/s, with the hydraulic conductivity increasing away from the Ohio River. The main groundwater flow direction is to the east, toward the production wells. The groundwater gradient is steep, in the range of 0.03 ft/ft to 0.04 ft/ft.

4.1.4 Mercury Wastewater Collection Tank Hydrogeology

The Mercury Wastewater Collection Tanks are located in the central area of the PPG Natrium Plant, on the upper river terrace. The subsurface is comprised of fine-to-coarse, loose-to-dense sand and gravel, as described on the boring logs for Monitoring Wells MW-118, MW-119, and MW-120. Calculations derived from the falling-head tests performed in these monitoring wells reveal hydraulic conductivities which range from 1.9×10^{-3} cm/s to 9.2×10^{-3} cm/s, which are consistent with the geologic material described in the boring logs. The local groundwater table is almost flat, with a groundwater flow direction to the west, from the upper terraces of the Ohio River Valley toward the industrial production wells.

4.1.5 Inorganics Waste Pond Hydrogeology

The Inorganics Waste Pond SWMU is located in the south-central portion of the facility. The local geology, as described in the boring logs of Monitoring Wells MW-103, MW-104, and MW-105, is comprised of fine-to-medium sand which varies from silty to gravelly. Although not confirmed by the results of the permeability tests performed in these monitoring wells (hydraulic conductivities which range from 3.0×10^{-3} cm/s to 8.5×10^{-3} cm/s), it appears that the subsurface beneath this SWMU consists of a lens of lower permeability material. This interpretation is consistent with the localized groundwater mound depicted in Figure 1. Groundwater flow beneath this SWMU is radial, toward the production wells which surround the Inorganics Waste Pond. The local groundwater mounding effect may be a result of surface recharge in combination with the expected relatively low permeability of the near-surface material (as determined from the boring logs generated in this area), which has a relatively low dissipation factor as compared to the surrounding subsurface material.

4.1.6 BHC Waste Pile Hydrogeology

The BHC Waste Pile is situated adjacent to the Ohio River, to the south of the Inorganics Waste Pond. The subsurface geology as described in the boring log prepared for Monitoring Well MW-110 indicates a predominance of low permeability geologic materials such as silty fine sand, silty clay, and gravelly clay. The geology is consistent with areas near the Ohio River Bank, areas exposed to a siltation process in the past as well as during the flood stage of the river. However, the formation permeability calculated from data obtained from Monitoring Well MW-110 (1.5×10^{-3} cm/s) does not appear to be consistent with the local lithology. The local hydraulic gradient is steep (0.04 ft/ft), with a flow direction toward the east from the Ohio River toward the production wells. To the immediate south of the BHC

Waste Pile, the slope of the groundwater table is influenced by the surface topography (former creek which discharged into the Ohio River) as well as industrial Pumping Well No. 19 which is located in the immediate vicinity of this SWMU.

4.1.7 Barium Waste Landfill Hydrogeology

The Barium Waste Landfill is the southernmost SWMU at the PPG Natrium Plant. It is located approximately 1,500 feet south of the BHC Waste Pile. The local geology, as described in the boring logs of Monitoring Wells MW-106, MW-107, MW-108, and MW-109, is comprised of silty clay, silty very fine sand, and loose-to-medium dense sand and gravel. Groundwater flow in the immediate vicinity of the Barium Waste Landfill is predominantly controlled by Production Well 57, which is located approximately 150 feet north (plant north) of this SWMU. Production Well 57, in conjunction with Production Wells 50 and 51, also serves to control the regional direction of groundwater movement in this portion of the facility as evidenced by the groundwater gradient derived from the October 16, 1989 groundwater elevation data (i.e., movement of groundwater from the Ohio River inland [plant east] toward these wells). It appears that the Barium Waste Landfill is situated above a channel of highly conductive materials which parallels the Ohio River. Hydraulic conductivities calculated at this location range from 1.3×10^{-2} cm/s to 9.9×10^{-3} cm/s.

4.2 Contaminant Occurrence in Groundwater

The groundwater analytical data presented in this section have been obtained from the groundwater samples collected during the period October 16 to 18, 1989. In accordance with the RCRA permit, the samples were analyzed for the SWMU-specific parameters as presented in Table 7. The analytical data sheets, QA/QC documentation, and method references are provided in Appendix D.

4.2.1 Marshall Plant Waste Pond

Four monitoring wells located about the Marshall Plant Waste Pond were sampled for the Verification Investigation; of these, three were newly installed (MW-100, MW-101, and MW-102), while the fourth (MW-5) was an existing monitoring well installed during a previous study. As shown in Figure 1, Monitoring Wells MW-5 and MW-100 were identified as upgradient monitoring wells, while MW-101 and MW-102 are located hydraulically downgradient from the Marshall Plant Waste Pond.

As presented in Table 11, 11 parameters were detected at various concentrations above the criteria, including several compounds found in the upgradient samples. Volatile organics were the most prevalent of the parameters detected in the upgradient well samples, with tetrachloroethylene noted at a maximum concentration of 200.0 ppb at Monitoring Well MW-100. Cadmium and chromium were detected in Monitoring Well MW-5 at concentrations of 23.0 ppb and 50.0 ppb, respectively, while p-dichlorobenzene was detected at 13.0 ppb at Monitoring Well MW-100.

Several compounds were detected at elevated levels in downgradient Monitoring Wells MW-101 and MW-102. Arsenic was detected at a maximum concentration of 30.0 ppb at Monitoring Well MW-102, while chromium was identified at levels of 320.0 ppb and 370.0 ppb in Monitoring Wells MW-101 and MW-102, respectively. As shown in Table 11, volatile and semivolatile organics were also identified at elevated concentrations in the downgradient monitoring wells. The highest concentration of organics was detected at Monitoring Well MW-102. At this location, the data reveal 1,600.0 ppb of chloroform, 750.0 ppb of trichloroethylene, 200.0 ppb of tetrachloroethylene, 300.0 ppb of chlorobenzene, 230.0 ppb of 1,2,4-trichlorobenzene, 2,000.0 ppb of o-dichlorobenzene, and 2,000.0 ppb of p-dichlorobenzene.

A review of the relative contaminant concentrations identified in the monitoring wells located in the immediate vicinity of the Marshall Plant Waste Pond and examination of the local groundwater gradient (Figure 1) confirm that the predominant direction of groundwater movement beneath this SWMU is eastward (plant east), in the general direction of the series of production wells. It does not appear that constituents are migrating from the Marshall Plant Waste Pond toward the Ohio River.

4.2.2 Inorganics Waste Pond

Three new monitoring wells installed around the Inorganics Waste Pond were sampled during the Verification Investigation. Monitoring Well MW-105 was originally identified as an upgradient monitoring well relative to the Inorganics Waste Pond while Monitoring Wells MW-103 and MW-104 were selected as downgradient monitoring locations. However, as shown in Figure 1, groundwater flow direction in this general area as determined from the October 16, 1989 data reveals that at the time of sample collection, Monitoring Well MW-103 would most likely be considered as hydraulically upgradient with respect to the Inorganics

Waste Pond, while Monitoring Wells MW-104 and MW-105 would be considered as hydraulically downgradient.

As summarized in Table 12, groundwater samples collected at this SWMU were analyzed for several total metals constituents as well as TOC and TOX. Of the total metals constituents analyzed, only selenium was not detected at any of the monitoring wells. Although the overall concentration of contaminants was lowest in upgradient Monitoring Well MW-103, the contaminants were still present at levels above the permit criteria. Although Monitoring Well MW-104 contained the fewest constituents, the concentrations of the constituents detected were elevated with respect to the concentrations reported in the other monitoring wells (e.g., barium at 17,000.0 ppb, chromium at 650.0 ppb, and lead at 1,000.0 ppb). Arsenic and mercury were not detected at Monitoring Well MW-104. Groundwater samples obtained from Monitoring Well MW-105 revealed elevated concentrations of constituents as compared to those samples collected from Monitoring Well MW-103. Groundwater samples submitted for TOC and TOX analysis revealed that these parameters were present at relatively low concentrations, between the range of 5.0 to 9.0 parts per million (ppm).

As suggested on the groundwater contour map (Figure 1), the Inorganics Waste Pond is located near a groundwater divide. Thus, groundwater which may locally have an easterly component of movement beneath this SWMU would be quickly captured by the groundwater flow as controlled by the production wells to the north and south.

4.2.3 Barium Waste Landfill

Groundwater samples were collected from four new monitoring wells strategically positioned about the Barium Waste Landfill. As shown in Figure 1, Monitoring Well MW-106 was identified as an upgradient monitoring point, while Monitoring Wells MW-108 and MW-109 were identified as hydraulically downgradient from the Barium Waste Landfill. The location for Monitoring Well MW-107 was selected based on the groundwater contour map prepared from the April 13, 1989 groundwater elevation data, which suggested that there may be a local migration of groundwater away from this SWMU to the east, outside of the influence of Pumping Wells Nos. 50, 51, 53, and 57. Therefore, Monitoring Well MW-107 is also considered to be a downgradient monitoring well with respect to the Barium Waste Landfill.

As presented in Table 13, there were no volatile organics detected at any of the monitoring wells sampled. Similarly, TOC was noted at relatively low (e.g., 4.0 to 7.0 ppm) concentrations in each of the samples analyzed. Analyses for total metals, however, revealed that barium and lead were present at elevated concentrations at each of the monitoring wells, including upgradient Monitoring Well MW-106, where barium was detected at a concentration of 23,000.0 ppb and lead at a concentration of 1,100.0 ppb. At the downgradient monitoring wells, barium was detected at concentrations which ranged from 12,000.0 ppb to 18,000.0 ppb, while lead was detected at concentrations which ranged from 510.0 ppb to 1,700.0 ppb.

A review of the groundwater contour map (Figure 1) indicates that Monitoring Well MW-106 is located hydraulically upgradient with respect to the Barium Waste Landfill. Therefore, the presence of barium and lead at elevated concentrations in samples withdrawn from this well is most likely not attributed to groundwater migration but may indicate that the landfill boundary extends further than originally defined.

4.2.4 Benzene Hexachloride Waste Pile

Groundwater samples were collected from two new wells identified as Monitoring Wells MW-110 and MW-111 (Figure 1). Existing Monitoring Well MW-16 was also scheduled to be sampled due to its proximity to this SWMU; however, at the time of sample collection, an obstruction was noted within the well which prevented the collection of samples. It should be noted that Monitoring Well MW-111 had to be repositioned from its original location as drilling operations at the original location revealed the presence of a filter-cake type of material which was identified as BHC.

Analytical results from the two monitoring wells sampled are summarized in Table 14. Monitoring Well MW-111, which would be considered as hydraulically upgradient with respect to the BHC Waste Pile, did not contain any volatile organics above the detection limits. Lead, however, was detected at 130.0 ppb in this monitoring well. Analysis of the groundwater data obtained from Monitoring Well MW-110 revealed the presence of lead at 350.0 ppb, as well as elevated concentrations of several volatile organics (e.g., chloroform at 2,600.0 ppb, trichloroethylene at 110.0 ppb, tetrachloroethylene at 430.0 ppb, and trans-1,2-dichloroethylene at 110.0 ppb).

Although elevated levels of contaminants were detected in the immediate vicinity of the BHC Waste Pile, it is apparent that groundwater beneath this SWMU is being intercepted by Pumping Well No. 19 and may also be within the cone of influence produced by the series of pumping wells situated northwest of the BHC Waste Pile (e.g., Nos. 10, 40, 41, 8, and 39). Groundwater potentially contaminated by this SWMU does not appear to be migrating toward the Ohio River.

4.2.5 Fly Ash Landfill

Five monitoring wells were installed in the immediate vicinity of the Fly Ash Landfill (SWMU No. 10). Two upgradient monitoring wells, identified as MW-112 and MW-113, were positioned along the western border of the two units; while three downgradient wells, identified as MW-114, MW-115, and MW-116, were located along the eastern borders of the two units (Figure 1).

Groundwater samples collected from these monitoring wells were analyzed for barium and iron (total metals) as well as for sulfate concentration, total alkalinity, and pH. A summary of the analytical data is presented in Table 15. The presence of barium was reported at concentrations above that specified in the RCRA permit at all sample locations. The highest concentrations are at monitoring wells locations MW-112 (1,300.0 ppb), MW-114 (1,300.0 ppb), and MW-116 (3,900.0 ppb) which, as shown in Figure 1, are located in the southern half of the SWMU. It should be noted that barium (total) was detected at a concentration of 372.0 ppm during an analysis for trace metals in the fly ash material (June 14, 1988). These data suggest that the fly ash itself may be a contributor to the elevated levels of barium detected in the groundwater samples.

High alkalinity (pH of 12.09) was reported at Monitoring Well MW-115, while samples collected from Monitoring Wells MW-112 and MW-113 exhibited acidic characteristics (pH of 5.47 and 5.80, respectively).

Groundwater movement beneath this SWMU is predominantly toward the east-southeast, toward the pumping wells. It appears that there may be a localized component of flow in the vicinity of Monitoring Well MW-112, which is toward the Ohio River. This may be a result of groundwater mounding, a phenomenon which often occurs in landfilled areas. The suggestion of some groundwater movement toward the river is further substantiated by the elevated concentrations of barium detected at Monitoring Well MW-112.

4.2.6 Sanitary Landfill

Two monitoring wells were sampled at this SWMU; existing Monitoring Well MW-32 was selected as an upgradient monitoring location, while Monitoring Well MW-117 was installed to provide a downgradient monitoring location with respect to the Sanitary Landfill (Figure 1).

Groundwater samples collected from these two wells were analyzed for the presence of several volatile and semivolatile compounds. As summarized in Table 16, the upgradient monitoring well (MW-32) did not contain any of the selected compounds above the detection limits. In the downgradient well (MW-117), two volatile organics were detected at concentrations slightly above the permit criteria. Trichloroethene was identified at a concentration of 27.0 ppb, and tetrachloroethene was identified at a concentration of 32.0 ppb at this location.

As shown on the groundwater contour map (Figure 1), groundwater movement beneath this portion of the facility is to the southeast toward the production wells.

4.2.7 Mercury Wastewater Collection Tanks

Three groundwater monitoring wells were installed and sampled in the vicinity of the Mercury Wastewater Collection Tanks. Existing Monitoring Well MW-10 was scheduled to be sampled during the Verification Investigation. However, this well was found to be damaged beyond use at the time of the groundwater sampling event. Monitoring Well MW-118 was originally identified as an upgradient monitoring location, while Monitoring Wells MW-119 and MW-120 were identified as downgradient monitoring locations with respect to this SWMU. As shown in Figure 1, the groundwater gradient in the general vicinity of this SWMU is very flat. However, examination of the groundwater contour map reveals that the general movement of groundwater is west-northwest, toward the production well. Therefore, Monitoring Well MW-118 cannot definitively be considered as upgradient with respect to SWMU No. 14.

As summarized in Table 17, mercury was the only compound analyzed for and it was detected in each monitoring well at levels above the permit criteria. As with the other SWMUs investigated during this study, groundwater beneath this SWMU is moving toward the center of the plant under the influence of the plant production wells.

4.3 Contaminant Occurrence in Soil

Nine soil samples were collected in the vicinity of the Mercury Wastewater Collection Tanks during the Verification Investigation. Soil samples were collected on September 20, 21, 22, and 26, 1989 in conjunction with the installation of monitoring wells at this SWMU. The methodology incorporated in the collection of soil samples is discussed in Section 3.4.2 of this report. Analytical data sheets, QA/QC documentation, and method references are provided in Appendix D.

Mercury Wastewater Collection Tanks. Nine soil samples were analyzed for the presence of mercury at this SWMU. Three of these samples, identified as SS-1, SS-2, and SS-3, were surface soil samples collected at biased locations about the Mercury Wastewater Collection Tanks, while the other six samples were collected during the advancement of the boreholes which were drilled for the installation of Monitoring Wells MW-118, MW-119, and MW-120. Soil sampling locations are presented in Figure 2.

As summarized in Table 18, mercury was detected in several soil samples at concentrations above the permit criteria of 1.0 ppm. In the surface soil samples, mercury was detected in each sample at levels which ranged from 7.1 to 90.0 ppm, with the highest concentration noted in Sample SS-1, which was collected at a location which was topographically low with respect to the containment tanks. As discussed in Section 3.4.2 of this report, soil samples were collected at two intervals during advancement of boreholes in this area. The first samples (identified with suffix-01) were collected at depths of 6 to 12 inches below ground surface, while the second samples (identified with suffix-02) were collected at a depth just above the water table. Those soil samples collected immediately above the water table did not reveal the presence of mercury above the 1.0 ppm criteria as defined in the permit. The maximum mercury concentration in this sample interval was 0.7 ppm, as noted at Location MW-118-02. However, mercury was noted at elevated levels in the near-surface samples collected from two of the three borehole locations. Sample MW-118-01 revealed a mercury concentration of 750.0 ppm, while Sample MW-119-01 showed mercury at a level of 130.0 ppm.

5.0 Conclusions

The Verification Investigation was conducted at the PPG Natrium Plant to determine whether releases have or have not occurred from the seven SWMUs. Specifically, a groundwater investigation was to be implemented, the results of which could be used to determine whether further investigation or remediation would be warranted. To accomplish this objective, groundwater monitoring wells installed at strategic locations with respect to each SWMU were sampled and analyzed for unit-specific parameters as outlined in Part II.B.1.b(3) of the facility's RCRA permit (No. WVD 00 433 6343). Analytical results obtained from these samples were then compared against the groundwater concentration criteria listed for each parameter in Part II.B.1.b(4) of the permit to determine if further investigation would be warranted at each SWMU.

5.1 Parameter Concentration

As discussed in Section 4.2 of this report, specific parameters analyzed for were identified in the groundwater samples collected about each of the SWMUs at variable concentrations. At each SWMU, at least one constituent was identified at a level which was in excess of the concentration limit designated for that parameter in the RCRA permit.

5.2 Groundwater Flow Direction

As described in Section 4.1 of this report, groundwater flow at the PPG Natrium plant is controlled by the industrial pumping wells located throughout the facility. At each of the SWMUs investigated during this study, groundwater movement was predominantly toward the center of the plant due to the influence of the production wells. One exception to this trend is near the western border of the Fly Ash Landfill, where groundwater mounding was identified. This phenomenon may result in a localized component of flow toward the Ohio River.

As the production wells are scheduled to remain in operation at their current capacity throughout the life of the plant, it is reasonable to assume that groundwater will continue to migrate toward the center of the plant under the influence of the production wells.

5.3 Fly Ash Landfill Inspection and Repair Procedures

As directed in Section II.B.2 of the RCRA permit, PPG is required to submit a description of the procedures used to inspect the soil cap and embankment sides of the Fly Ash Landfill (SWMU 10) in the event that barium concentrations in the downgradient groundwater samples (e.g., Monitoring Wells MW-114, MW-115, and MW-116) equal or exceed 1.0 ppm. In the event that deficiencies are noted in the cap or berm during an inspection, PPG has been directed to describe the repair procedures to be implemented to prevent the release of hazardous constituents during heavy rainfall or flooding.

A review of the analytical data reveals that barium was identified in the groundwater at a concentration of greater than 1.0 ppm in two of the three downgradient monitoring wells (1.3 ppm at MW-114 and 3.9 ppm at MW-116). In accordance with Permit Condition II.B.2, a plan for the inspection, maintenance, and repair procedures to be implemented at this SWMU has been prepared. This interim plan was presented under separate cover in the document entitled, "SWMU No. 10 Cap Inspection and Repair Procedures, Natrium Plant, New Martinsville, West Virginia," dated June 1992. PPG has notified EPA Region III of its intention to perform voluntary interim corrective measures at SWMU 10. At the completion of this work a final plan which meets the West Virginia Solid Waste Management Regulations will be submitted for EPA approval.

Presently, a stockpile of clay fill materials is maintained in an accessible area (above the 100-year floodplain of 642 feet) for emergency maintenance of berm and cap deficiencies. This material was obtained from the same source as that material used in construction of the dikes and is relatively impermeable (e.g., calculated hydraulic conductivities which range from 3.3×10^{-7} to 4.5×10^{-8} cm/s), as evidenced by the permeability tests performed on this material (Table 19). This material will be used for repairs should inspection of the cap and embankment reveal deficiencies.

5.4 RCRA Facility Investigation

In accordance with Section II. A and Section II. B.1.b(4) of the PPG Natrium Plant's RCRA permit (No. WVD 00 433 6343), if SWMU-specific, permit-established constituents are identified in groundwater or soil (as applicable) at concentrations above their respective permit-established concentrations, a RCRA Facility Investigation (RFI) is required to be implemented "to characterize the subsurface conditions and the nature and extent of the release."

As previously indicated, at least one constituent was identified at each SWMU subject to the Verification Investigation at a concentration in excess of the permit established criteria. Therefore, an RFI Work Plan will be prepared which meets the objectives and requirements set forth in Permit Condition II.C.2.

TABLES

Table 1

Solid Waste Management Unit Characterization
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia
(Page 1 of 4)

Solid Waste Management Unit	Size (ft)	Volume (1,000 ft^3)	Depth (ft)	Waste Description[a]	Notes[a]
Marshall Plant Pond (SWMU No. 5)	275 x 220	485	~8	• Ferric chloride ($FeCL_4$) 2,760,000 pounds • Chlorinated benzenes and tar • Metals (Fe, Mn, Mg, Zn, Cd, Cu, V, Cr) • Tracifier waste - Halogenated aliphatics - Inorganic salts - CCl_4	• Walls and bottom constructed of local clay • Received waste from - Chlor-alkali plant - Chlorinated benzene plant - Titanium tetrachloride plant • Closure in 1979-80 - 6- to 8-inch clay - Includes concrete material under clay layer • Ponds in area of silty clay soil

Refer to footnotes at end of table.

Table 1

Solid Waste Management Unit	Size (ft)	Volume (1,000 ft^3)	Depth (ft)	Waste Description[a]	Notes[a]
Inorganics Waste Pond (SWMU No. 6)	225 x 140	190	~6	• $BaCO_3$ • $BaSO_4$ • Fe_2O_3 • SiO_2	• Walls and bottom of earthen material • Received wastewater and sludge from barium oxide plant • Closure in 1980, 6- to 8-inch clay and soil • Located near groundwater divide produced by pumping (1985 data) • Pond in area of suspected fill material
Barium Waste Landfill (SWMU No. 7)	200 x 200	150	~4	• $BaCO_3$ • $BaSO_4$ • Fe_2O_3 • SiO_2	• Constructed of local top soil and clay • Received solid wastes from barium plant • Closure in 1980; 6-inch soil cover
BHC Waste Pile (SWMU No. 8)	75 x 150	50	~20	• Benzene hexachloride isomers (a, b, q, BHC) • Chlorinated organic solvents (trace)	• Open waste pile on soil or fill • Received waste product from BHC plant • Material shipped off site in 1977 • No formal closure

Refer to footnotes at end of table.

Table 1
(Page 3 of 4)

Solid Waste Management Unit	Size (ft)	Volume (1,000 ft^3)	Depth (ft)	Waste Description[a]	Notes[a]
Fly Ash Landfill (SWMU No. 10)	300 x 1,800	4,725	~11	• $BaSO_4$ • $BaCO_3$ • Fe_2O_3 • SiO_2	• Constructed with clay bottom and dikes • Received: - Bottom ash prior to 1975 - Fly and bottom ash since 1975 • Progressive closure as areas become filled • Periodic barium waste deposited in southern tracts • Closure consists of 6-inch soil and grass • Landfill constructed in area of clay approximately 20 feet thick • Scrap metal may be present
Sanitary Landfill (SWMU No. 11)	1,100 x 500	5,500	-	• General trash and rubbish • Demolition debris • Construction refuse	• Constructed in sandy-clay loam material • Three separate cells; two closed • Class III nonchemical landfill

Refer to footnotes at end of table.

Table 1
(Page 4 of 4)

Solid Waste Management Unit	Size (ft)	Volume (1,000 ft^3)	Depth (ft)	Waste Description[a]	Notes[a]
Mercury Wastewater Tanks (SWMU No. 14)	-	-	-	• Mercuric sulfide • Mercuric chloride	• Consists of three tanks and treatment system • Treatment results in insoluble ground mercuric sulfide which is disposed of off site • Mercury has been detected in nearby monitoring wells

[a]Information based on 1985 and 1986 submittals by PPG to the EPA.

Table 2

EP Toxicity Test Results
Drill Cuttings
Benzene Hexachloride (BHC) Waste Pile
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Parameter	Concentration (ppb)
Methylene chloride	1.2
Chloroform	0.2
Carbon tetrachloride	<0.1
1,1,2-trichloroethylene	<0.1
Tetrachloroethylene	<0.1
Benzene	<10.0
Alpha BHC	1400.0

Table 3

Groundwater Monitoring Well Survey Data
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Monitoring Well No.[a]	North Plant Coordinate	East Plant Coordinate	Ground Surface Elevation (ft)	Top of Protective Casing Elevation (ft)	Top of PVC Casing Elevation (ft)
MW-100	2017.029	-806.675	635.326	638.297	638.102
MW-101	1985.635	-593.920	639.017	641.794	641.630
MW-102	2268.853	-563.538	640.101	643.547	643.409
MW-103	-1740.729	-172.146	645.942	648.988	648.854
MW-104	-1999.332	39.706	647.531	650.811	650.616
MW-105	-1728.538	-33.710	647.581	650.558	650.400
MW-106	4522.450	-767.387	-637.478	640.022	639.877
MW-107	-4585.288	-601.810	638.589	641.329	641.190
MW-108	4247.689	-741.818	641.503	644.182	644.034
MW-109	4221.067	-575.809	647.867	650.870	650.735
MW-110	-2769.356	-675.606	636.354	639.668	639.067
MW-111	-2972.943	-607.009	630.537	630.907	630.539
MW-112	2929.619	-768.067	632.989	635.693	635.485
MW-113	4162.680	-486.488	633.999	637.145	636.891
MW-114	3072.288	-487.282	637.670	640.834	640.610
MW-115	3938.791	-298.750	638.540	641.326	641.140
MW-116	2536.958	-537.086	638.729	641.796	641.649
MW-117	3337.530	-42.187	652.525	655.656	655.492
MW-118	280.833	-43.575	657.339	660.100	659.859
MW-119	298.986	121.745	671.326	671.548	671.174
MW-120	212.017	65.205	671.630	671.864	671.487

[a]Refer to Figure 1 for monitoring well locations.

Table 4

Groundwater Monitoring Well
Universal Transverse Mercator (UTM) Coordinates
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Monitoring Well No.[a]	North Coordinate	East Coordinate
100	4399904.7913	512112.2603
101	4399940.3795	512167.2611
102	4400011.7478	512118.0135
103	4399164.1023	513006.8502
104	4399146.5847	513107.2314
105	4399194.4244	513036.4428
106	4398396.6717	513429.5550
107	4398422.0329	513474.2136
108	4398472.2168	513374.6819
109	4398511.4157	513407.6578
110	4398826.3310	513095.5357
111	4398792.8170	515151.5044
112	4400123.4367	511938.9590
113	4400463.7057	511758.8571
114	4400211.7939	511975.7234
115	4400449.3437	511846.6381
116	4400078.5164	512070.8157
117	4400361.7564	512025.7390
118	4399655.7714	512634.4362
119	4399693.1086	512669.0183
120	4399661.5473	512673.1099

[a]Refer to Figure 1 for monitoring well locations.

Table 5

Monitoring Well Data and Groundwater Elevations
PPG Industries, Inc.
Natrium Chemical Plant
New Martinsville, West Virginia

Well No.[a]	Elevation of Top of PVC (ft above msl)	Depth to Water from Top of PVC (ft) (10-16-89)	Water Table Elevation (ft above msl) (10-16-89)	Screen Length (ft)	Top of Screen Elevation (ft above msl)	Bottom of Screen Elevation (ft above msl)	Condition (plugged, damaged, usable)
MW-1	690.99	36.68	654.31	10.0	646.49	636.49	Usable
MW-2	687.44	71.48	615.98	30.0	618.44	588.44	Usable
MW-3	640.30	NA	NA	30.0	618.80	588.80	Usable
MW-4	637.16	NA	NA	40.0	619.66	579.66	Usable
MW-5	629.57	5.22	624.35	10.0	619.57	609.57	Usable
MW-6	646.89	32.20	614.69	40.0	611.39	571.39	Usable
MW-7	654.58	39.41	615.17	40.0	610.08	570.08	Usable
MW-8	657.86	42.43	615.43	40.0	613.36	573.36	Usable
MW-9	668.46	52.82	615.64	40.0	624.46	584.46	Usable
MW-10	673.59	57.67	615.92	30.0	611.59	581.59	Damaged
MW-11	671.56	55.25	616.31	30.0	610.06	580.06	Usable
MW-12	673.02	56.47	616.55	30.0	613.52	583.52	Damaged
MW-13	667.56	50.23	617.33	30.0	612.26	582.26	Damaged
MW-14	649.10	31.95	617.15	37.0	617.10	580.10	Usable
MW-15	646.01	NA	NA	40.0	614.51	574.51	Plugged
MW-16	642.18	23.22	616.96	43.0	619.48	576.48	Damaged
MW-17	641.85	24.51	617.34	40.0	614.35	574.35	Usable
MW-18	641.87	24.04	617.83	40.0	615.87	575.87	Usable
MW-19	667.92	50.98	616.94	40.0	617.42	577.42	Usable

Refer to footnotes at end of table.

Table 5
(Continued)

Well No.[a]	Elevation of Top of PVC (ft above msl)	Depth to Water from Top of PVC (ft) (10-16-89)	Water Table Elevation (ft above msl) (10-16-89)	Screen Length (ft)	Top of Screen Elevation (ft above msl)	Bottom of Screen Elevation (ft above msl)	Condition (plugged, damaged, usable)
MW-30	657.42	41.92	615.50	20.0	617.92	597.72	Usable
MW-31	674.28	59.06	615.22	20.0	617.78	597.78	Usable
MW-32	658.86	43.67	615.19	20.0	616.86	596.86	Usable
MW-33	667.61	52.81	614.80	20.0	616.11	596.11	Usable
MW-100	638.10	13.89	624.21	20.0	624.21	604.21	Usable
MW-101	641.63	25.65	615.98	20.0	618.93	598.93	Usable
MW-102	643.41	27.73	615.68	20.0	620.50	600.50	Usable
MW-103	648.85	30.67	618.18	20.0	620.09	600.09	Usable
MW-104	650.62	33.31	617.31	20.0	630.47	610.47	Usable
MW-105	650.40	32.22	618.18	20.0	621.65	601.65	Usable
MW-106	639.88	23.25	616.63	20.0	627.56	607.56	Usable
MW-107	641.19	24.61	616.58	20.0	629.98	609.98	Usable
MW-108	644.03	28.25	615.78	20.0	626.09	606.09	Usable
MW-109	650.74	35.04	615.70	20.0	622.74	602.74	Usable
MW-110	639.07	16.35	622.72	20.0	625.00	605.00	Usable
MW-111	630.54	6.07	624.47	15.0	626.34	611.34	Usable
MW-112	635.49	10.37	625.12	20.0	621.94	601.94	Usable
MW-113	636.89	13.30	623.59	20.0	619.89	599.89	Usable
MW-114	640.62	25.25	615.34	20.0	619.62	599.62	Usable
MW-115	641.14	25.15	615.99	20.0	617.73	597.73	Usable
MW-116	641.65	26.06	615.59	20.0	619.90	599.90	Usable
MW-117	655.49	40.22	615.27	20.0	616.97	596.97	Usable

Refer to footnotes at end of table.

Table 5
(Continued)

Well No.[a]	Elevation of Top of PVC (ft above msl)	Depth to Water from Top of PVC (ft) (10-16-89)	Water Table Elevation (ft above msl) (10-16-89)	Screen Length (ft)	Top of Screen Elevation (ft above msl)	Bottom of Screen Elevation (ft above msl)	Condition (plugged, damaged, usable)
MW-118	659.86	43.61	616.25	20.0	617.17	597.17	Usable
MW-119	671.17	54.96	616.21	20.0	624.62	604.62	Usable
MW-120	671.49	55.19	616.30	20.0	622.33	602.33	Usable
MW-121	639.50	18.66	620.84	20.0	626.49	606.49	Usable
MW-122	637.31	19.96	617.35	20.0	623.72	603.72	Usable

[a]Refer to Figure 1 for monitoring well locations.

Table 6

Soil Sample Identifications
SWMU No. 14
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Sample Identification[a]	Description	Sample Depth (ft below ground surface)
SS-1	Downgradient surface soil sample	(0.5-1.0)
SS-2	Downgradient surface soil sample	(0.5-1.0)
SS-3	Upgradient surface soil sample	(0.5-1.0)
MW-118-01	Surface soil sample collected during advancement of Borehole MW-118	(0.5-1.0)
MW-118-02	Soil sample collected just above groundwater table at Borehole MW-118	(40.0-41.0)
MW-119-01	Surface soil sample collected during advancement of Borehole MW-119	(0.5-1.0)
MW-119-02	Soil sample collected just above groundwater table at Borehole MW-119	(45.0-46.0)
MW-120-01	Surface soil sample collected during advancement of Borehole MW-120	(0.5-1.0)
MW-120-02	Soil sample collected just above groundwater table at Borehole MW-120	(45.0-46.0)

[a]Refer to Figure 2 for soil sample locations.

Table 7

EPA-Requested Parameters for Groundwater Analysis
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

SWMU	EPA-Requested Parameters	
Marshall Plant Pond	Inorganics:	Cd, As, Cr,
	Organics:	Chloroform Methylene chloride Carbon tetrachloride Trichloroethane Benzene Trichloroethylene Tetrachloroethylene m-, p-, and o-dichlorobenzene Trichlorobenzene Benz(a)anthracene Benzo(b)fluoranthene Benzo(a)pyrene Chlorinated naphthalene Chlorobenzene Dibenz(a,h)anthracene 7,12-Dimethylbenz(a)anthracene 3-Methylcholanthrene Naphthalene Fluoranthene
Inorganics Waste Pond	Inorganics:	As, Ba, Cr, Fe, Pb, Hg, Se
	Organics:	Total organic carbon (TOC) Total organic halogen (TOX)
Barium Waste Landfill	Inorganics:	Pb, Ba
	Organics:	Total organic carbon (TOC) Benzene Carbon tetrachloride
BHC Waste Pile	Inorganics:	Pb
	Organics:	Chloroform Carbon tetrachloride trans-1,2-dichloroethylene Bromo dichloromethane Trichloroethylene Tetrachloroethylene Benzene

Table 7
(Page 2 of 2)

SWMU	EPA-Requested Parameters	
Marshall Plant Pond	Inorganics:	Cd, As, Cr,
Fly Ash Landfill	Inorganics:	Ba, Fe, Sulfate
	Total alkalinity pH	
Sanitary Landfill	Organics:	Chloroform Methylene chloride Carbon tetrachloride Trichloethane Benzene Trichloroethylene Tetrachloroethylene m-, p-, and o-dichlorobenzene
Mercury Wastewater Tanks	Inorganics:	Hg[a]

[a]Six soil samples collected from boreholes drilled for the installation of monitoring wells at this SWMU were also analyzed for the presence of mercury.

Table 8
Analytical Detection Limits
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Parameter	Detection Limit Groundwater ($\mu g/\ell$)[a]	Detection Limit Soil (mg/kg)[b]
Arsenic	10	1
Barium	200	
Cadmium	5	
Chromium	10	
Lead	5	
Mercury	0.2	1
Selenium	5	
Benzene	5	
Carbon tetrachloride	5	
Chlorobenzene	5	
Chloroform	5	
m-dichlorobenzene	10	
p-dichlorobenzene	10	
o-dichlorobenzene	10	
Fluoranthene	10	
Methylene chloride	5	
Naphthalene	10	
Trichlorobenzene	10	
Trichloroethane	5	

Refer to footnotes at end of table.

Table 8

Parameter	Detection Limit Groundwater (µg/ℓ)[a]	Detection Limit Soil (mg/kg)[b]
Trichlorethylene	5	
Tetrachloroethylene	5	
Trans-1,2-dichloroethylene	5	
Bromo dichloromethane	5	
Benz(a)anthracene	10	
Benzo(b)fluoranthene	10	
Benzo(a)pyrene	10	
Chlorinated naphthalene	10	
Dibenz(a,h)anthracene	10	
7,12-dimethylbenz(a)anthracene	10	
3-methylcholanthrene	10	

[a]µg/ℓ = Micrograms per liter or parts per billion.

[b]mg/kg = Milligrams per kilogram or parts per million.

Table 9
Analytical Detection Methods
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

	Parameter	Method
Groundwater		
	Metals	
	Arsenic	EPA 206.2
	Barium	EPA 200.7
	Cadmium	EPA 200.7
	Lead	EPA 200.7 or 239.2
	Mercury	EPA 245.1
	Selenium	EPA 270.2
	Total Chromium	SW846 7190
	Iron	SW846 7380
	Total Metal Digestion	CLP SOW 7/88
	Organics	
	Volatiles	SW846 8240
	Semivolatiles	SW846 8270
	General Chemistry	
	Sulfate	SW846 9038
	TOC	SW846 9060
	TOX	SW846 9020
	Alkalinity	EPA 310.1
Soils		
	Metals	
	Mercury	SW846 7471

Table 10
Calculated Hydraulic Conductivities
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Monitoring Well No.	Hydraulic Conductivity	
	(cm/s)	(ft/day)
MW-100	6.4×10^{-4}	1.8
MW-101	1.9×10^{-5}	0.1
MW-102	7.8×10^{-3}	22.2
MW-103	8.5×10^{-3}	24.3
MW-104	3.7×10^{-3}	10.3
MW-105	3.0×10^{-3}	8.6
MW-106	3.9×10^{-3}	11.1
MW-107	1.7×10^{-2}	46.1
MW-108	1.3×10^{-2}	36.4
MW-109	9.9×10^{-3}	26.7
MW-110	1.5×10^{-3}	4.3
MW-111	9.1×10^{-4}	2.6
MW-112	8.1×10^{-3}	23.1
MW-113	2.7×10^{-3}	7.6
MW-114	8.7×10^{-3}	24.8
MW-115	1.1×10^{-3}	3.0
MW-116	7.0×10^{-5}	6.1
MW-117	9.1×10^{-3}	25.6
MW-118	1.9×10^{-3}	5.3
MW-119	3.2×10^{-3}	9.2
MW-120	9.2×10^{-3}	26.1

Table 11
Marshall Plant Waste Pond
Groundwater Analytical Results
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia
(Page 1 of 2)

Parameter	Criteria (µg/ℓ)	Sample Identification			
		MW-5	MW-100	MW-101	MW-102
		(Concentration [µg/ℓ])			
Total Metals					
Arsenic	10	ND10	ND10	10	30
Cadmium	5	23	ND5	ND5	ND5
Chromium	10	50	30	320	370
Volatile Organic Compounds					
Methylene Chloride	5	ND5	ND5	ND50	ND100
Chloroform	5	ND5	120	1,500	1,600
1,1,1-Trichloroethane	5	ND5	ND5	ND50	ND100
Carbon tetrachloride	5	ND5	15	ND50	ND100
Trichloroethylene	5	44	60	ND50	750
Benzene	5	ND5	ND5	ND50	ND100
Tetrachloroethylene	5	8	200	140	200
Chlorobenzene	5	ND5	ND5	410	300
Semivolatile Organic Compounds					
1,2,4-Trichlorobenzene	10	ND10	ND10	64	230
Benzo(a)anthracene	10	ND10	ND10	ND20	ND200
Benzo(b)anthracene	10	ND10	ND10	ND20	ND200
Benzo(a)pyrene	10	ND10	ND10	ND20	ND200
2-Chloronaphthalene	10	ND10	ND10	ND20	ND200
o-Dichlorobenzene	10	ND10	ND10	260	2,000
m-Dichlorobenzene	10	ND10	ND10	ND20	ND200

PT/8-92/WP/303409.Tables:Table.11(PPG Natrium Table 11)

Table 11
(Page 2 of 2)

Parameter	Criteria (µg/ℓ)	Sample Identification MW-5	MW-100	MW-101	MW-102
		(Concentration [µg/ℓ])			
p-Dichlorobenzene	10	ND10	13	180	2,000
7,12-Dimethylbenz(a)anthracene	10	ND10	ND10	ND100	ND1000
3-Methylchloranthrene	10	ND10	ND10	ND100	ND1000
Dibenz(a,h)anthracene	10	ND10	ND10	ND20	ND200
Naphthalene	10	ND10	ND10	ND20	ND200
Fluoranthene	10	ND10	ND10	ND20	ND200

ND = Denotes that the compound was not detected at or above the detection limit shown.

Table 12

Inorganics Waste Pond
Groundwater Analytical Results
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Parameter	Criteria (μg/ℓ)[a]	Sample Identification MW-103 (Concentration [μg/ℓ])	MW-104	MW-105
Total Metals				
Arsenic	10	140	ND100[b]	150
Barium	200	400	17,000	3,400
Chromium	10	160	650	300
Iron	NA[c]	250,000	1,400,000	420,000
Lead	5	650	1,000	900
Mercury	0.2	4.5	ND0.5	1.2
Selenium	5	ND5	ND5	ND5
Other Parameters				
Total Organic Carbon (TOC)	NA	7,000	5,000	9,000
Total Organic Halides (TOX)	NA	90	60	ND50

[a]μg/ℓ - Micrograms per liter or parts per billion.

[b]ND - Denotes that the compound was not detected at or above the detection limit shown.

[c]NA - Not available in permit criteria.

Table 13

Barium Waste Landfill
Groundwater Analytical Results
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Parameter	Criteria (µg/ℓ)[a]	Sample Identification MW-106	MW-107	MW-108	MW-109
		(Concentration [µg/ℓ])			
Total Metals					
Barium	200	23,000	12,000	18,000	13,000
Lead	5	1,100	510	1,700	890
Volatile Organic Compounds					
Carbon tetrachloride	5	ND5[b]	ND5	ND5	ND5
Benzene	5	ND5	ND5	ND5	ND5
Other Parameters					
Total Organic Carbon (TOC)	NA[c]	7,000	4,000	6,000	4,000

[a]µg/ℓ - Micrograms per liter or parts per billion.

[b]ND - Denotes that the compound is not detected at or above the detection limit shown.

..A - Not available in permit criteria.

Table 14

Benzene Hexachloride (BHC) Waste Pile
Groundwater Analytical Results
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Parameter	Criteria (µg/ℓ)[a]	Sample Identification MW-110 (Concentration [µg/ℓ])	MW-111
Total Metals			
Lead	5	350	130
Volatile Organic Compounds			
Chloroform	5	2,600	ND5[b]
Carbon tetrachloride	5	ND100	ND5
Trans-1,2-dichloroethylene	5	110	ND5
Bromo dichloromethane	5	ND100	ND5
Trichloroethylene	5	110	ND5
Tetrachloroethylene	5	430	ND5
Benzene	5	ND100	ND5

[a]µg/ℓ - Micrograms per liter or parts per billion.

[b]ND - Denotes that the compound is not detected at or above the detection limit shown.

Table 15

Fly Ash Landfill
Groundwater Analytical Results
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Parameter	Criteria (μg/ℓ)[a]	Sample Identification MW-112	MW-113	MW-114	MW-115	MW-116
		(Concentration [μg/ℓ])				
Total Metals						
Barium	200	1,300	300	1,300	900	3,900
Iron	NA[b]	160,000	50,000	160,000	5,700	470,000
Sulfate	NA	480,000	120,000	140,000	2,000	69,000
Total Alkalinity	NA	6,000	12,000	140,000	2,000,000	200,000
pH[c]	NA	5.47	5.80	6.26	12.09	8.77

[a]μg/ℓ - Micrograms per liter or parts per billion.

[b]NA - Not available in the permit criteria.

'alues for pH are unit-less.

Table 16

Sanitary Landfill
Groundwater Analytical Results
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Parameter	Criteria (μg/ℓ)[a]	Sample Identification MW-117	MW-32
		(Concentration [μg/ℓ])	
Volatile Organic Compounds			
Methylene chloride	5	ND5[b]	ND5
Chloroform	5	ND5	ND5
1,1,1-Trichloroethane	5	ND5	ND5
Carbon tetrachloride	5	ND5	ND5
Trichloroethene	5	27	ND5
Benzene	5	ND5	ND5
Tetrachloroethene	5	32	ND5
Chlorobenzene	5	ND5	ND5
Semivolatile Organic Compounds			
o-Dichlorobenzene	10	ND10	ND50
m-Dichlorobenzene	10	ND10	ND50
p-Dichlorobenzene	10	ND10	ND50

[a]μg/ℓ - Micrograms per liter or parts per billion.

[b]ND - Denotes that the compound was not detected at or above the detection limit shown.

Table 17
Mercury Wastewater Collection Tanks
Groundwater Analytical Results
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

Parameter	Criteria (µg/ℓ)[a]	Sample Identification (Concentration [µg/ℓ])		
		MW-118	MW-119	MW-120
Total Metals				
Mercury	0.2	210	430	310

[a]µg/ℓ - Micrograms per liter or parts per billion.

Table 18

Mercury Wastewater Collection Tanks
Soil Sample Analytical Results
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

			Sample Identification							
Parameter	Criteria	MW-118-01	MW-118-02	MW-119-01	MW-119-02	MW-120-01	MW-120-02	SS-1	SS-2	SS-3
			(Concentration [mg/kg])[a]							
Total Metals										
Mercury	1.0	750[b]	0.7	130	0.3	0.1	ND0.1[c]	90	7.1	10

[a]mg/kg - Milligrams per kilogram or parts per billion.

[b]Average of three runs.

[c]ND - Denotes that the compound is not detected at or above the detection limit shown.

Table 19

Fly Ash Landfill
Permeability Test Results
Clay Liner, Berm, and Cap Material
PPG Industries, Inc.
Natrium Plant
New Martinsville, West Virginia

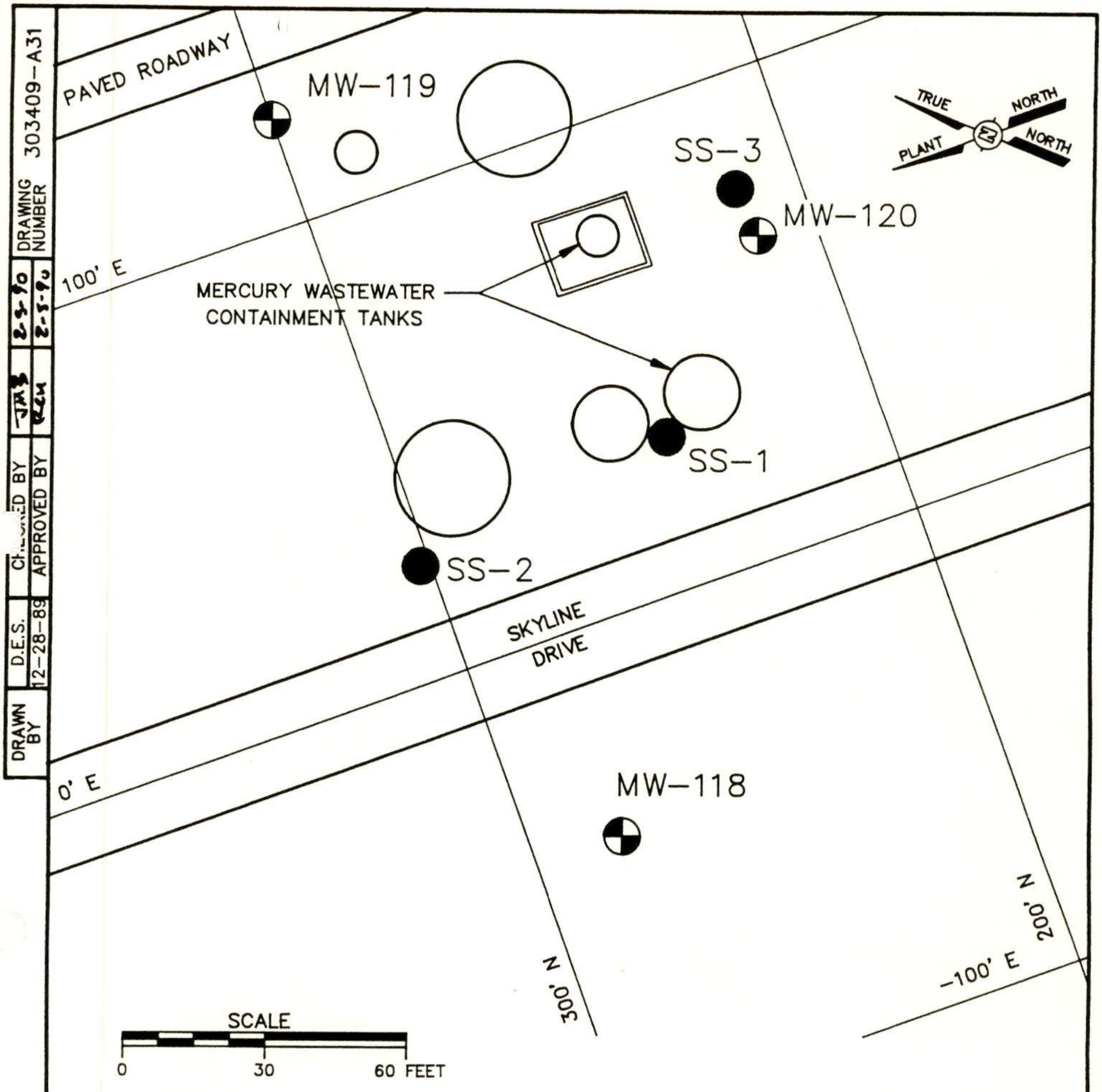
Sample No.	Dry Density (pcf)	Moisture Content (%)	Compaction (%)	Constant[a] Head (ft)	Hydraulic Conductivity (cm/s)
1	120.7	11.1	95.1	16	1.502×10^{-8}
2	121.2	11.2	94.7	16	1.598×10^{-8}
3	112.6	13.1	94.9	8	4.529×10^{-8}
4	115.6	12.1	94.9	16	1.413×10^{-8}
5	117.3	11.1	94.9	8	3.313×10^{-7}

[a]Unable to obtain measurable flows at 8-foot head on Samples Nos. 1, 2, and 4; increased head to 16 feet.

Notes:

1. Laboratory tests performed by Pittsburgh Testing Laboratory, Pittsburgh, Pennsylvania.
2. Data provided to IT Corporation by PPG Industries, Inc.

FIGURES



LEGEND:

SS-1 SURFACE SOIL SAMPLE LOCATION

MW-118 MONITORING WELL LOCATION (2 SAMPLES PER LOCATION)

STORAGE TANK

REFERENCE:
PPG INDUSTRIES DRAWING NO. 50-0806-1
AREA ARRANGEMENT MAIN PLANT, SHEET NO. 2

"Do Not Scale This Drawing"

132298

FIGURE 2

SOIL SAMPLE LOCATIONS
MERCURY WASTEWATER
CONTAINMENT AREA
NATRIUM CHEMICAL PLANT
NEW MARTINSVILLE, WEST VIRGINIA

PREPARED FOR

PPG INDUSTRIES INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

APPENDIX A

BORING LOGS

PROJECT NO:	303409	BORING NO:	MW-100	PAGE 1 OF 1	PROJECT NAME: PPG-NATRIUM
DATE BEGAN:	9-20-89	DATE FINISHED:	9-20-89	FIELD ENGINEER:	C. PETERMAN
DRILLER:	W. LIPE, T. CAREY	N:	-2017.03'	E:	-806.68'
GROUND SURFACE ELEV.:	635.33'	GWL DATE/TIME:	10-16-89	GWL DEPTH:	11.12'
DRILLING METHOD:	4 1/4" ID HOLLOW STEM AUGERS			EQUIPMENT:	SIMCO 4000
CONTRACTOR:	BOWSER-MORNER, INC.			CHECKED BY:	J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	U.S.C.S.	MONITOR TOOL	REMARKS
635.0	0.00	S 1	3-4-6-9	1.25		FILL, (soft, highly organic, dark brown-to-black silt - dry)	NA		HNU BACKGROUND READING IS 0.4 ppm
						3.5'			
						FILL, (dark brown-to-black silt with coal and ash - dry)	NA		
						5.6'			
630.0	-5.00	S 2	3-6-12-13	1.67		Firm, medium brown, silty CLAY - dry	cl		
						8.5'			
						NO RECOVERY	NA		
625.0	-10.00	S 3	4-6-6-8	0.0					
						13.5'			
						Firm, brown, sandy-to-silty CLAY - wet	cl		
620.0	-15.00	S 4	5-6-8-6	2.0					
						18.5'			
						Very loose to loose, brown, silty, fine SAND - wet	sm		
615.0	-20.00	S 5	2-2-2-2	2.0					
610.0	-25.00	S 6	2-3-4-3	2.0					
605.0	-30.00					BOTTOM OF BORING AT 30.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
600.0	-35.00								
	-40.00								

PROJECT NO: 303409	BORING NO: MW-101	PROJECT NAME: PPG-NATRIUM	
DATE BEGAN: 9-19-89	DATE FINISHED: 9-19-89	FIELD ENGINEER: C. PETERMAN	
DRILLER: W. LIPE, T. CAREY	S: 1985.64'	W: -593.92'	
GROUND SURFACE ELEV.: 639.02'	GWL DATE/TIME: 10-16-89	GWL DEPTH: 23.04'	
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS		EQUIPMENT: SIMCO 4000	
CONTRACTOR: BOWSER-MORNER, INC.		CHECKED BY: J. BURDICK	

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS		REMARKS
	0.00	S 1	5-11-11-11	1.83		FILL, (firm, brown and light gray, silty clay - dry)	NA		HNU BACKGROUND READING IS 0.2 ppm
635.0	-5.00	S 2	2-2-3-1	1.0		5.2' FILL, (very loose, black, fine coal and ash - moist)	NA		
630.0	-10.00	S 3	5-7-10-16	1.75		8.5' Firm, brown, silty CLAY - dry			
625.0	-15.00	S 4	2-4-3-4	1.75		13.0' Soft, brown, silty CLAY - moist	cl		
620.0						18.5' Medium dense, reddish-brown, silty, fine SAND - moist	sm		
	-20.00	S 5	6-7-9-12	0.5		20.2' Firm, gray, silty CLAY - moist	cl		
615.0	-25.00	S 6	3-5-8-9	0.75		23.5' Medium dense, brown, poorly graded SAND and GRAVEL - wet			
610.0	-30.00	S 7	12-14-16-10	0.92			sp		
605.0	-35.00	S 8	12-10-9-9	0.25		33.5' Medium dense, brown, poorly graded SAND - wet			
600.0	-40.00					BOTTOM OF BORING AT 40.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
595.0	-45.00								
590.0	-50.00								

PAGE 1 OF 1

PROJECT NO: 303409 | BORING NO: MW-102 | PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-19-89 | DATE FINISHED: 9-19-89 | FIELD ENGINEER: C. PETERMAN
DRILLER: W. LIPE, T. CAREY | N: 2268.85' | E: -563.54'
GROUND SURFACE ELEV.: 640.10' | GWL DATE/TIME: 10-16-89 | GWL DEPTH: 24.92'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS | EQUIPMENT: SIMCO 4000
CONTRACTOR: BOWSER-MORNER, INC. | CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	MONITORING WELL	REMARKS
640.0	0.00	S 1	3-4-5-10	1.5		Soft, brown, silty CLAY - dry			HNU BACKGROUND READING IS 5.5 ppm
						3.0' Firm, brown, silty CLAY - dry			
635.0	-5.00	S 2	8-11-12-13	1.58			cl		
630.0	-10.00	S 3	3-5-9-12	1.42					
						13.5' Loose, brown, silty, fine SAND - moist			
625.0	-15.00	S 4	3-4-5-4	1.75					
						17.5' Loose, brown, silty, fine SAND - wet			
620.0	-20.00	S 5	2-3-2-5	2.0			sm		
615.0	-25.00	S 6	5-6-4-7	1.58					
						26.0' Loose, brown, poorly graded, gravelly, coarse SAND - wet	sp		
						28.0' Loose, brown, poorly graded, gravelly, coarse SAND with silt - wet			
610.0	-30.00	S 7	5-6-4-6	1.25					
						33.5' Medium dense, brown, poorly graded, gravelly, coarse SAND with SILT - wet	sp/sm		
605.0	-35.00	S 8	9-13-9-10	1.5					
600.0	-40.00					BOTTOM OF BORING AT 40.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
595.0	-45.00								
	-50.00								

PAGE 1 OF 1

PROJECT NO: 303409 | BORING NO: MW-103 | PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-13-89 | DATE FINISHED: 9-14-89 | FIELD ENGINEER: C. PETERMAN
DRILLER: J. FALBO, L. BECHTOL | N: -1740.73' | E: -172.15'
GROUND SURFACE ELEV.: 645.94' | GWL DATE/TIME: 10-16-89 | GWL DEPTH: 27.76'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS | EQUIPMENT: CME-55
CONTRACTOR: BOWSER-MORNER, INC. | CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	U.S.C.S.	MONITORING INST.	REMARKS
	0.00								
645.0		S 1	17-20-25-30	2.0		Dense, black, poorly graded, gravelly, medium SAND - dry	sp		
						3.5'			
640.0	-5.00	S 2	6-8-18-21	1.5		Firm, grayish-brown, clayey SILT with some coarse sand and gravel - dry	ml		UNIDENTIFIED ORGANIC ODOR NOTED IN DRILL CUTTINGS FROM 8.0' TO 10.0'
635.0	-10.00	S 3	4-6-8-18	1.0					
630.0	-15.00	S 4	13-17-50/3	1.17					ORGANIC ODOR NOTED PREVIOUSLY EVIDENT TO 19.0'
						18.5'			
625.0	-20.00	S 5	16-20-21-26	1.5		Dense, brown, well graded, medium to coarse SAND and GRAVEL - dry	sw		
						23.5'			
620.0	-25.00	S 6	13-17-18-21	1.5		Dense, brown, poorly graded, gravelly, medium SAND - dry	sp		
▼						28.5'			
615.0	-30.00	S 7	5-5-6-10	1.5		Medium dense, grayish-black, poorly graded, medium SAND - wet			GROUNDWATER NOTED AT 30.0' DURING DRILLING
						33.5'			
610.0	-35.00	S 8	WOR*	1.5		Very loose, grayish-black, poorly graded, medium SAND - wet			
						38.5'			
605.0	-40.00	S 9	6-12-18-23	2.0		Medium dense, gray, well graded, fine to medium SAND - wet	sw		
						42.5'			
		S 10	9-15-19-20	1.0		Dense, grayish-brown, silty, fine SAND - wet	sm		
	-45.00								
600.0						BOTTOM OF BORING AT 45.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS WOR*: WEIGHT OF DRILL RODS
	-50.00								

PAGE 1 OF 1

PROJECT NO: 303409
BORING NO: MW-104
PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-22-89
DATE FINISHED: 9-22-89
FIELD ENGINEER: D. MARCUM
DRILLER: J. FALBO, L. BECHTOL
N: -1993.33'
E: 39.71'
GROUND SURFACE ELEV.: 647.53'
GWL DATE/TIME: 10-16-89
GWL DEPTH: 30.22'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS
EQUIPMENT: CME-55
CONTRACTOR: BOWSER-MORNER, INC.
CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	MONITOR	REMARKS
	0.00	S 1	7-11-14-11	1.5		Medium dense, brown to dark brown, poorly graded, very fine SAND with some gravel - dry			
645.0									
	-5.00	S 2	6-7-7-7	1.5					
640.0						8.5'			
						Medium dense, brown, poorly graded, medium SAND and GRAVEL - moist	sp		
	-10.00	S 3	5-11-12-12	1.0					
635.0									
	-15.00	S 4	8-6-6-11	0.67					
630.0						18.5'			
						Medium dense, brown, silty, fine SAND - moist			
	-20.00	S 5	6-6-9-9	1.0			sm		
625.0						23.5'			
						Medium dense, brown, poorly graded, fine to medium SAND and GRAVEL - moist			
	-25.00	S 6	11-11-14-12	1.3			gp/sp		
6?0.0						28.5'			
						Medium dense, brown, well graded, fine to medium SAND - wet			
	-30.00	S 7	11-12-16-19	1.3			sw		GROUNDWATER NOTED AT 30.0' DURING DRILLING
615.0						33.5'			
						Medium dense, brown, poorly graded, fine to medium SAND and GRAVEL - wet			
	-35.00	S 8	7-11-12-12	1.5					
610.0						40.0'	gp/sp		
	-40.00	S 9	9-17-30-50/3	1.0		Very dense, brown, poorly graded, medium SAND and GRAVEL - wet			
605.0						42.5'			
		S 10	12-9-9-9	1.5		Medium dense, brown, poorly graded, fine to medium SAND and GRAVEL, wet			
	-45.00					BOTTOM OF BORING AT 45.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
600.0									
	-50.00								

PAGE 1 OF 1

PROJECT NO: 303409 BORING NO: MW-105 PROJECT NAME: PPG-NATRIUM

DATE BEGAN: 9-15-89 DATE FINISHED: 9-15-89 FIELD ENGINEER: D. MARCUM

DRILLER: J. FALBO, L. BECHTOL N: -1728.54' E: -33.71'

GROUND SURFACE ELEV.: 647.58' GWL DATE/TIME: 10-16-89 GWL DEPTH: 29.40'

DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS EQUIPMENT: CME-55

CONTRACTOR: BOWSER-MORNER, INC. CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	MONITOR WELL	REMARKS
	0.00	S 1	4-6-10-13	1.3		Firm, grayish-brown, CLAY with some sand and gravel - dry	cl		
645.0						3.5'			
	-5.00	S 2	2-2-3-5	0.5		Soft, brown CLAY - dry			
640.0						8.5'			
	-10.00	S 3	4-4-13-13	1.0		Firm, brown CLAY with some gravel - dry			
635.0						13.0'			
	-15.00	S 4	6-20-28-36	1.5		Hard, brown CLAY - dry 16.0'			
						Dense, brown, poorly graded, fine to medium SAND with gravel - dry 18.0'	sp		
630.0									
	-20.00	S 5	16-26-32-33	1.42		Very dense, brown, fine to medium SAND and gravel - dry			
625.0						23.0'			
	-25.00	S 6	16-20-27-30	1.5		Dense, brown, poorly graded, fine SAND with some gravel - dry			
[illegible].0									
	-30.00	S 7	9-11-27-28	1.33					
615.0						33.5'			
						Medium dense, grayish-black, silty, fine SAND - wet	sm		
	-35.00	S 8	6-6-7-10	1.67					
610.0									
	-40.00	S 9	8-10-15-18	1.42		42.5'			UNIDENTIFIED ORGANIC ODOR NOTED ON SPLIT-SPOON SAMPLES S-9 AND S-10
605.0		S 10	4-10-10-10	1.5		Medium dense, black, silty, fine SAND with some GRAVEL - wet			
	-45.00					BOTTOM OF BORING AT 45.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
600.0									
	-50.00								

PROJECT NO: 303409
BORING NO: MW-106
PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-21-89
DATE FINISHED: 9-21-89
FIELD ENGINEER: C. PETERMAN
DRILLER: W. LIPE, T. CAREY
N: -4552.50'
E: -767.39'
GROUND SURFACE ELEV.: 637.48'
GWL DATE/TIME: 10-16-89
GWL DEPTH: 20.85'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS
EQUIPMENT: SIMCO 4000
CONTRACTOR: BOWSER-MORNER, INC.
CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	CONTAMINANT TOT.	REMARKS
	0.00	S 1	5-6-10-12	0.75		Firm, brown, silty CLAY with intermixed fine coal and ash - dry			HNU BACKGROUND READING IS 0.4 ppm
635.0						3.0' Soft, brown, silty CLAY - dry			
	-5.00	S 2	6-5-5-4	1.5			cl		
630.0						8.5'			
	-10.00	S 3	4-8-12-13	1.75		Firm, brown, silty CLAY with small pieces of coal - moist			
625.0						13.0' Medium dense, brown, silty, very fine SAND - wet			
	-15.00	S 4	3-6-5-8	1.42					
620.0						18.0'			
	-20.00	S 5	3-3-2-4	1.58		Loose, brown, silty, very fine SAND - wet	sm		
615.0						23.5' Dense, brown, silty, poorly graded SAND and GRAVEL - wet			
	-25.00	S 6	7-21-23-13	1.5					
610.0									
	-30.00					BOTTOM OF BORING AT 30.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
605.0									
	-35.00								
600.0									
	-40.00								

PROJECT NO: 303409
BORING NO: MW-107
PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-21-89
DATE FINISHED: 9-21-89
FIELD ENGINEER: C. PETERMAN
DRILLER: W. LIPE, T. CAREY
N: -4585.29'
E: -601.81'
GROUND SURFACE ELEV.: 638.59'
GWL DATE/TIME: 10-16-89
GWL DEPTH: 22.01'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS
EQUIPMENT: SIMCO 4000
CONTRACTOR: BOWSER-MORNER, INC.
CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	MONITOR	REMARKS
	0.00	S 1	4-5-6-8	0.67		Firm, brown, silty CLAY with roots - dry	cl		HNU BACKGROUND READING IS 0.4 ppm
635.0						3.5'			
	-5.00	S 2	6-1-5-6	2.0		Loose, brown, silty, very fine SAND - moist	sm		
630.0						8.5'			
	-10.00	S 3	5-6-7-9	0.75		Medium dense, brown, poorly graded, fine SAND - moist	sp		
625.0									
	-15.00	S 4	8-9-6-8	1.33					
620.0						18.5'			
	-20.00	S 5	1-6-8-9	1.17		Loose to medium dense, brown, poorly graded SAND and GRAVEL - wet	gp/sp		
615.0									
	-25.00	S 6	6-3-6-4	1.5					
610.0									
	-30.00					BOTTOM OF BORING AT 30.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
605.0									
	-35.00								
600.0									
	-40.00								

PROJECT NO: 303409 | BORING NO: MW-108 | PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-22-89 | DATE FINISHED: 9-22-89 | FIELD ENGINEER: C. PETERMAN
DRILLER: W. LIPE, T. CAREY | N: -4247.69' | E: -741.82'
GROUND SURFACE ELEV.: 641.50' | GWL DATE/TIME: 10-16-89 | GWL DEPTH: 25.72'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS | EQUIPMENT: SIMCO 4000
CONTRACTOR: BOWSER-MORNER, INC. | CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	U.S.C.S.	CONSTRUCTION	REMARKS
	0.00	S 1	4-4-3-2	0.42		FILL, (loose, black cinders - moist)	NA		HNU BACKGROUND READING IS 1.3 ppm
640.0						3.0'			
						Firm, brown to dark brown, silty CLAY - moist	cl		
	-5.00	S 2	3-4-6-8	1.25					
635.0									
	-10.00	S 3	3-5-7-9	1.42					
630.0						13.5'			
						Medium dense, brown, silty, fine SAND - moist	sm		
	-15.00	S 4	6-6-9-10	1.92					
625.0									
	-20.00	S 5	7-7-10-13	0.83					
0.0						23.0'			
						Loose to medium dense, brown to dark brown, silty, poorly graded SAND and GRAVEL - wet	gp/sp		
	-25.00	S 6	11-9-7-17	0.75					
615.0									
	-30.00	S 7	4-4-5-7	0.75					
610.0									
	-35.00					BOTTOM OF BORING AT 35.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
605.0									
	-40.00								

PROJECT NO:	303409	BORING NO:	MW-109	PROJECT NAME:	PPG-NATRIUM
DATE BEGAN:	9-25-89	DATE FINISHED:	9-25-89	FIELD ENGINEER:	C. PETERMAN
DRILLER:	W. LIPE, T. CAREY	N:	-4221.07'	E:	-575.81'
GROUND SURFACE ELEV.:	647.87'	GWL DATE/TIME:	10-16-89	GWL DEPTH:	32.17'
DRILLING METHOD:	4 1/4" ID HOLLOW STEM AUGERS			EQUIPMENT:	SIMCO 4000
CONTRACTOR:	BOWSER-MORNER, INC.			CHECKED BY:	J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	CONSTRUCTION DETAIL	REMARKS
	0.00	S 1	>50	0.0		FILL, (large pieces of concrete and gravel - dry)			HNU BACKGROUND READING IS 0.3 ppm
645.0							NA		
	-5.00	S 2	3-2-4-8	1.08		FILL, (brown, clayey gravel and coal fines - moist)			
640.0						8.0'			
						Firm, brown, silty CLAY, moist			
	-10.00	S 3	2-9-12-13	1.08			cl		
635.0						12.5'			
						Medium dense, brown, silty, fine SAND - moist			
	-15.00	S 4	6-7-9-8	1.75					
630.0							sm		
	-20.00	S 5	5-6-7-5	1.42					
625.0						23.5'			
						Medium dense, brown, poorly graded, fine SAND - moist to wet			
	-25.00	S 6	1-4-8-8	1.58					
620.0							sp		
	-30.00	S 7	7-7-3-6	0.75		31.0'			
						Loose to medium dense, brown, silty to sandy GRAVEL - wet			
▼ 615.0									
	-35.00	S 8	4-4--6-5	0.58					
610.0							gm		
						40.0'			
	-40.00	S 9	12-10-14-15	1.5		Medium dense, brown, silty to sandy GRAVEL - wet			
605.0									
	-45.00	S 10	11-12-10-9	2.0					
600.0						BOTTOM OF BORING AT 47.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
	-50.00								

PROJECT NO: 303409
BORING NO: MW-110
PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-18-89
DATE FINISHED: 9-18-89
FIELD ENGINEER: D. MARCUM
DRILLER: J. FALBO, L. BECHTOL
N: -2769.36'
E: -675.61'
GROUND SURFACE ELEV.: 636.35'
GWL DATE/TIME: 10-16-89
GWL DEPTH: 13.63'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS
EQUIPMENT: CME-55
CONTRACTOR: BOWSER-MORNER, INC.
CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	CONTAMINANT CONDITION	REMARKS
	0.00								
635.0		S 1	7-10-50/3	0.83		Very dense, dark brown, poorly graded, fine to medium SAND with some gravel - dry 3.5'	sp		
	-5.00					Medium dense, black, silty, fine SAND - dry			
630.0		S 2	9-15-15-17	1.33		8.5'	sm		
	-10.00					Soft, brown CLAY with some gravel - dry			
625.0		S 3	3-3-3-3	0.33		14.5'			
	-15.00					Very soft to soft, brownish-gray, silty CLAY - wet			GROUNDWATER NOTED AT 15.0' DURING DRILLING
620.0		S 4	1-1-1-2	2.0			cl		
	-20.00								
615.0		S 5	1-1-1-2	1.83					
	-25.00								
610.0		S 6	2-2-3-5	1.83					
		S 7	2-2-2-3	1.83					
	30.00					BOTTOM OF BORING AT 30.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
605.0									
	-35.00								
600.0									
	-40.00								

PROJECT NO: 303409 BORING NO: MW-111 PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-27-89 DATE FINISHED: 9-27-89 FIELD ENGINEER: C. PETERMAN
DRILLER: J. FALBO, L. BECHTOL S: -2972.94' W: -607.01'
GROUND SURFACE ELEV.: 630.54' GWL DATE/TIME: 10-16-89 GWL DEPTH: 6.07'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS EQUIPMENT: CME-55
CONTRACTOR: BOWSER-MORNER, INC. CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	U.S.C.S.	CONDITION	REMARKS
630.0	0.00	S 1	15-12-40-28	1.75		FILL, (coal, cinders, brown and gray siltstone - dry) 4.0'	NA		HNU BACKGROUND READING IS 1.9 ppm
625.0	-5.00	S 2	2-1-1-1	1.17		FILL, (coal, cinders, brown and gray siltstone - wet) 8.5'			
620.0	-10.00	S 3	7-13-13-13	1.92		Medium dense, dark brown, poorly graded, medium SAND - wet 13.0'	sp		
615.0	-15.00	S 4	7-35-50/3	1.5		Very dense, dark brown and aqua green, well graded, medium to coarse SAND and GRAVEL, partially consolidated - wet 18.5'	sw		
610.0	-20.00	S 5	50/3	0.25		Very dense, brownish-gray, silty SAND - wet	sm		
						BOTTOM OF BORING AT 22.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
605.0	-25.00								
600.0	-30.00								
595.0	-35.00								
	-40.00								

PAGE 1 OF 1

PROJECT NO: 303409
BORING NO: MW-112
PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-18-89
DATE FINISHED: 9-18-89
FIELD ENGINEER: C. PETERMAN
DRILLER: W. LIPE, T. CAREY
N: -2929.62'
E: -768.07'
GROUND SURFACE ELEV.: 632.99'
GWL DATE/TIME: 10-16-89
GWL DEPTH: 7.87'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS
EQUIPMENT: SIMCO 4000
CONTRACTOR: BOWSER-MORNER, INC.
CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	MONITOR	REMARKS
	0.00	S 1	3-5-6-8	1.08		FILL, (fine coal and cinder particles with loose, brown, silty clay - moist)	NA		HNU BACKGROUND READING IS 1.4 ppm
630.0						4.0'			
	-5.00	S 2	4-5-7-7	0.17		FILL, (coal and cinders - moist)			
25.0						8.5'			
	-10.00	S 3	5-2-4-7	1.17		Soft, brown, silty CLAY - moist	cl		
620.0						13.5'			
	-15.00	S 4	2-2-3-5	1.83		Loose, brown, silty, fine SAND - wet	sm		
615.0									
	-20.00	S 5	6-3-5-4	1.75					
610.0						23.5'			
	-25.00	S 6	3-2-1-2	1.75		Very soft, brown, clayey SILT - wet	ml		
605.0						28.5'			
						Loose, brown, silty, fine SAND - wet	sm		
	-30.00					BOTTOM OF BORING AT 30.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
600.0									
	-35.00								
595.0									
	-40.00								

PROJECT NO: 303409	BORING NO: MW-113	PROJECT NAME: PPG-NATRIUM	
DATE BEGAN: 9-14-89	DATE FINISHED: 9-14-89	FIELD ENGINEER: C. PETERMAN	
DRILLER: W. LIPE, T. CAREY	N: 4162.68'	E: -486.49'	
GROUND SURFACE ELEV.: 634.00'	GWL DATE/TIME: 10-16-89	GWL DEPTH: 10.41'	
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS		EQUIPMENT: SIMCO 4000	
CONTRACTOR: BOWSER-MORNER, INC.		CHECKED BY: J. BURDICK	

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	MONITORING WELL	REMARKS
	0.00	S 1	4-5-4-7	0.58		Soft, brownish-gray, sandy SILT with roots - moist			
						3.5'			
630.0						Firm, dark brown SILT with roots - dry	ol		
	-5.00	S 2	4-5-7-7	0.17					
625.0						9.0'			
						Soft to firm, brown, silty CLAY - moist			
▼	-10.00	S 3	4-5-6-8	1.5					
620.0									
	-15.00	S 4	3-2-3-3	0.13			cl		
						18.5'			
615.0						Very soft, brown, silty CLAY - wet			
	-20.00	S 5	1-1-1-1	1.08					
						23.5'			
610.0						Very loose to loose, brown, silty, fine SAND - wet			
	-25.00	S 6	2-2-2-3	1.0					
605.0							sm		
	-30.00	S 7	3-4-6-3	2.0					
600.0									
	-35.00					BOTTOM OF BORING AT 35.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
595.0									
	-40.00								

PAGE 1 OF 1

PROJECT NO: 303409 | BORING NO: MW-114 | PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-15-89 | DATE FINISHED: 9-15-89 | FIELD ENGINEER: C. PETERMAN
DRILLER: W. LIPE, T. CAREY | N: 3072.29' | E: -487.28'
GROUND SURFACE ELEV.: 637.67' | GWL DATE/TIME: 10-16-89 | GWL DEPTH: 22.33'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS | EQUIPMENT: SIMCO 4000
CONTRACTOR: BOWSER-MORNER, INC. | CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS		REMARKS
	0.00	S 1	3-10-13-15	1.83		FILL, (black, fine material with coal and ash - dry)	NA		
635.0									
	-5.00	S 2	2-4-5-4	0.0					
630.0						9.5'			
						Firm, brown CLAY mottled with light gray clay - moist	cl		
	-10.00	S 3	5-7-8-8	1.17					
625.0						13.5'			
						Loose to medium dense, brown, silty, fine SAND - moist			
	-15.00	S 4	4-5-7-9	1.67					
620.0						18.0'			
						Loose to medium dense, brown, silty, fine SAND with coal fragments - wet	sm		
	-20.00	S 5	3-4-4-5	2.0					
615.0									
	-25.00	S 6	5-9-7-10	1.42		26.0'			
						Medium dense, brown, poorly graded, silty, coarse SAND with gravel - wet	sp		
].0						29.0'			
						Loose, brown, silty to sandy GRAVEL - wet	gm		
	-30.00	S 7	8-4-5-8	0.75					
605.0									
	-35.00	S 8	5-4-5-6	2.0					
600.0									
	-40.00					BOTTOM OF BORING AT 40.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
595.0									
	-45.00								
590.0									
	-50.00								

PROJECT NO: 303409	BORING NO: MW-115	PAGE 1 OF 1	
DATE BEGAN: 9-12-89	DATE FINISHED: 9-13-89	PROJECT NAME: PPG-NATRIUM	
DRILLER: W. LIPE, T. CAREY	S: 3938.79'	FIELD ENGINEER: C. PETERMAN	
GROUND SURFACE ELEV.: 638.54'	GWL DATE/TIME: 10-16-89	W: -298.75'	
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS		GWL DEPTH: 22.55'	
CONTRACTOR: BOWSER-MORNER, INC.		EQUIPMENT: SIMCO 4000	
		CHECKED BY: J. BURDICK	

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	MONITOR CONSTR.	REMARKS
	0.00	S 1	4-7-13-14	1.42		Firm, dark gray to black, clayey SILT - dry	ml		
635.0									
	-5.00	S 2	3-2-3-6	1.58		Soft, black, clayey SILT - dry 6.0'			
						Soft, brown to light gray, silty CLAY - moist 9.0'	cl		
630.0						Firm, brown, silty CLAY - moist			
	-10.00	S 3	5-8-11-10	1.67		13.5'			
625.0						Firm, brown, silty CLAY with light gray clay lenses - wet			
	-15.00	S 4	4-6-5-7	1.83		18.5'			
620.0						Loose to medium dense, brown, silty, well graded, fine to coarse SAND - wet	sw		
	-20.00	S 5	2-5-2-6	1.58					
615.0									
	-25.00	S 6	10-12-13-12	1.0		28.5'			
610.0						Firm, brown, silty CLAY - wet 30.3'	cl		
	-30.00	S 7	3-9-10-12	1.17		Loose to medium dense, brown, silty, coarse SAND and GRAVEL - wet	gm		
605.0						36.0'			
	-35.00	S 8	4-5-9-8	1.58		Loose, brown, silty, fine SAND - wet	sw		
600.0						40.7'			
	-40.00	S 9	5-3-5-11	1.83		Loose, well graded, coarse SAND and GRAVEL - wet	sw		
595.0						BOTTOM OF BORING AT 42.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
	-45.00								
590.0									
	-50.00								

PAGE 1 OF 1

PROJECT NO: 303409
BORING NO: MW-116
PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-18-89
DATE FINISHED: 9-18-89
FIELD ENGINEER: C. PETERMAN
DRILLER: W. LIPE, T. CAREY
N: 2536.96'
E: -537.09'
GROUND SURFACE ELEV.: 638.73'
GWL DATE/TIME: 10-16-89
GWL DEPTH: 23.14'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS
EQUIPMENT: SIMCO 4000
CONTRACTOR: BOWSER-MORNER, INC.
CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS		REMARKS
	0.00	S 1	10-12-17-12	1.67		FILL, (black, fine to medium coal and ash - dry)	NA		
635.0	-5.00	S 2	3-4-7-6	0.75					
630.0	-10.00	S 3	4-6-7-12	1.92		11.0'			
						Firm, brown, silty CLAY - dry 13.5'	cl		
625.0	-15.00	S 4	5-5-7-8	1.33		Medium dense, brown, silty, fine SAND - moist	sm		
620.0	-20.00	S 5	8-9-11-12	1.5		23.5'			
615.0	-25.00	S 6	5-7-7-8	0.83		Medium dense, brown, silty, coarse SAND and GRAVEL - wet 28.0'	gm		
610.0	-30.00	S 7	6-4-8-7	0.5		Medium dense, brown, well graded, coarse SAND and GRAVEL - wet	gw		
605.0	-35.00	S 8	19-9-6-7	0.58					
600.0	-40.00					BOTTOM OF BORING AT 40.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
595.0	-45.00								
590.0	-50.00								

PROJECT NO: 303409	BORING NO: MW-117	PAGE 1 OF 2
DATE BEGAN: 9-12-89	DATE FINISHED: 9-13-89	PROJECT NAME: PPG-NATRIUM
DRILLER: J. FALBO, L. BECHTOL	S: 3337.53'	FIELD ENGINEER: D. MARCUM
GROUND SURFACE ELEV.: 652.53'	GWL DATE/TIME: 10-16-89	W: -42.19'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS		GWL DEPTH: 37.26'
CONTRACTOR: BOWSER-MORNER, INC.		EQUIPMENT: CME-55
		CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	[illegible]	REMARKS
	0.00	S 1	10-11-12-10	2.0		TOPSOIL (4.0") underlain by firm, brown SILT - dry	ol		
650.0						3.5'			
						Firm, brown, sandy SILT - dry	ml		
	-5.00	S 2	4-4-7-8	2.0					
645.0						8.5'			
						Medium dense, brown, clayey SAND with gravel - dry	gc		
	-10.00	S 3	4-9-7-8	1.0					
640.0						13.5'			
						Medium dense, brown to black, well graded, medium to coarse SAND with gravel - dry	sw		
	-15.00	S 4	4-6-8-10	1.33					
635.0									
	-20.00	S 5	12-12-7-8	1.0					
630.0									
	-25.00	S 6	8-8-8-12	1.0					
625.0						28.5'			
						Medium dense, brown, poorly graded GRAVEL with some coarse sand - dry	gp		
	-30.00	S 7	17-7-7-8	1.0					
620.0						34.0'			
						Very dense, brown, poorly graded GRAVEL with cobbles - moist			
	-35.00	S 8	47-38-28-50	0.33					
615.0									
						39.0'			
	-40.00								

PROJECT NO:	303409	BORING NO:	MW-117	PROJECT NAME:	PPG-NATRIUM
DATE BEGAN:	9-12-89	DATE FINISHED:	9-13-89	FIELD ENGINEER:	D. MARCUM
DRILLER:	J. FALBO, L. BECHTOL	N:	3337.53'	E:	-42.19'
GROUND SURFACE ELEV.:	652.53'	GWL DATE/TIME:	10-16-89	GWL DEPTH:	37.26'
DRILLING METHOD:	4 1/4" ID HOLLOW STEM AUGERS			EQUIPMENT:	CME-55
CONTRACTOR:	BOWSER-MORNER, INC.			CHECKED BY:	J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	U.S.C.S.	CONTENT TOT.	REMARKS
	-40.00	S 9	9-10-13-15	1.0		Medium dense, brown, poorly graded GRAVEL and COBBLES with some brown, coarse sand - wet	gp		GROUNDWATER NOTED AT 40.0' DURING DRILLING
610.0						44.0'			
	-45.00	S 10	6-2-2-13	0.67		Loose to medium dense, brown, well graded, coarse SAND and GRAVEL - wet	gw/sw		
605.0									
	-50.00	S 11	4-5-7-10	1.5					
600.0						52.5'			
		S 12	9-13-28-31	1.5		Dense, brown, poorly graded, coarse SAND with some gravel - wet	sp		
	-55.00					BOTTOM OF BORING AT 55.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
595.0									
	-60.00								
590.0									
	-65.00								
585.0									
	-70.00								
580.0									
	-75.00								
575.0									
	-80.00								

PAGE 1 OF 2

PROJECT NO: 303409
BORING NO: MW-118
PROJECT NAME: PPG-NATRIUM
DATE BEGAN: 9-26-89
DATE FINISHED: 9-26-89
FIELD ENGINEER: D. MARCUM
DRILLER: J. FALBO, L. BECHTOL
N: 280.83'
E: -43.58'
GROUND SURFACE ELEV.: 657.34'
GWL DATE/TIME: 10-16-89
GWL DEPTH: 41.09'
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS
EQUIPMENT: CME-55
CONTRACTOR: BOWSER-MORNER, INC.
CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	U.S.C.S.	MONITOR DETAIL	REMARKS
	0.00	S 1	3-1-1-3	1.0		Soft, brown, silty CLAY with some gravel - moist	cl		
655.0						3.5'			
						Medium dense, brown, silty, fine to medium SAND - moist	sm		
	-5.00	S 2	5-6-6-7	1.17					
650.0						8.5'			
						Medium dense, brown, poorly graded, medium SAND - moist	sp		
	-10.00	S 3	3-6-6-7	1.5					
645.0									
	-15.00	S 4	5-6-8-14	1.5					
640.0						19.5'			
	-20.00	S 5	3-5-8-8	1.17		Medium dense, brown, well graded, fine to medium SAND with some gravel - moist	sw		
635.0						23.5'			
						Medium dense, brown, silty, fine to medium SAND with some gravel - moist	sm		
	-25.00	S 6	5-10-10-20	1.0					
630.0						28.5'			
						Dense to very dense, brown, well graded, fine to medium SAND with gravel - moist	sw		
	-30.00	S 7	8-19-24-28	1.5					
625.0									
	-35.00	S 8	19-33--30-39	1.5					
620.0									
	-40.00								

PROJECT NO: 303409 | BORING NO: MW-118 | PROJECT NAME: PPG-NATRIUM

DATE BEGAN: 9-26-89 | DATE FINISHED: 9-26-89 | FIELD ENGINEER: D. MARCUM

DRILLER: J. FALBO, L. BECHTOL | N: 280.83' | E: -43.58'

GROUND SURFACE ELEV.: 657.34' | GWL DATE/TIME: 10-16-89 | GWL DEPTH: 41.09'

DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS | EQUIPMENT: CME-55

CONTRACTOR: BOWSER-MORNER, INC. | CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	CONCENTRATION	REMARKS
▼	-40.00	S 9	27-47-47-39	1.5		Dense to very dense, brown, well graded, fine to medium SAND with gravel - moist			
615.0						43.5'			GROUNDWATER NOTED AT 44.0' DURING DRILLING
	-45.00	S 10	13-20-23-27	1.5		Medium dense to dense, brown, well graded, fine to medium SAND with gravel - wet			
610.0							SW		
	-50.00	S 11	15-20-24-29	1.33					
605.0									
	-55.00	S 12	12-12-18-20	1.42					
600.0		S 13	9-10-12-18	1.5					
	-60.00					BOTTOM OF BORING AT 59.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
595.0									
	-65.00								
590.0									
	-70.00								
585.0									
	-75.00								
580.0									
	-80.00								

PROJECT NO: 303409	BORING NO: MW-119	PROJECT NAME: PPG-NATRIUM	
DATE BEGAN: 9-20-89	DATE FINISHED: 9-20-89	FIELD ENGINEER: D. MARCUM	
DRILLER: J. FALBO, L. BECHTOL	N: 298.99'	E: 121.75'	
GROUND SURFACE ELEV.: 671.33'	GWL DATE/TIME: 10-16-89	GWL DEPTH: 55.12'	
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS		EQUIPMENT: CME-55	
CONTRACTOR: BOWSER-MORNER, INC.		CHECKED BY: J. BURDICK	

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	CONTINUITY	REMARKS
	0.00	S 1	13-17-22-16	1.5		Dense, brown, well graded, fine to medium SAND with gravel - dry			
670.0									
						3.5'			
	-5.00	S 2	3-3-3-4	1.33		Loose to medium dense, brown, well graded, medium to coarse SAND with gravel - moist			
665.0									
	-10.00	S 3	3-3-3-4	1.0					
660.0									
						13.5'			
						Medium dense to dense, brown, well graded, fine to medium SAND - moist			
	-15.00	S 4	4-5-6-8	1.0					
655.0									
	-20.00	S 5	9-10-10-14	1.17			SW		
[illegible].0									
	-25.00	S 6	15-20-22-31	1.67					
645.0									
	-30.00	S 7	14-14-28-39	1.17					
640.0									
						33.5'			
	-35.00	S 8	21-33-40-41	1.33		Very dense, brown, fine to medium SAND with gravel - moist			
635.0									
	-40.00								

PROJECT NO: 303409 BORING NO: MW-119 PROJECT NAME: PPG-NATRIUM

DATE BEGAN: 9-20-89 DATE FINISHED: 9-20-89 FIELD ENGINEER: D. MARCUM

DRILLER: J. FALBO, L. BECHTOL N: 298.99' E: 121.75'

GROUND SURFACE ELEV.: 671.33' GWL DATE/TIME: 10-16-89 GWL DEPTH: 55.12'

DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS EQUIPMENT: CME-55

CONTRACTOR: BOWSER-MORNER, INC. CHECKED BY: J. BURDICK

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	DOCUMENTATION	REMARKS
	-40.00	S 9	36-38-37-41	0.17		Dense to very dense, brown, well graded, fine to medium SAND with gravel and cobble fragments - moist	SW		
630.0									
	-45.00	S 10	14-19-21-28	1.42					
625.0						48.5'			
						Very dense, borwn, silty, fine SAND with gravel and cobble fragments - wet			GROUNDWATER NOTED AT 50.0' DURING DRILLING
	-50.00	S 11	20-38-41-41	1.58					
620.0						53.5'	sm		
						Medium dense, brown, silty, very fine SAND - wet			
	-55.00	S 12	8-10-19-21	1.5					
615.0						58.5'			
						Medium dense, brown, well graded, medium to coarse SAND with gravel - wet	SW		
	-60.00	S 13	4-5-6-10	1.42					
10.0		S 14	10-13-18-20	1.67					
	-65.00					BOTTOM OF BORING AT 65.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
605.0									
	-70.00								
600.0									
	-75.00								
595.0									
	-80.00								

PAGE 1 OF 2

PROJECT NO: 303409	BORING NO: MW-120	PROJECT NAME: PPG-NATRIUM	
DATE BEGAN: 9-21-89	DATE FINISHED: 9-21-89	FIELD ENGINEER: D. MARCUM	
DRILLER: J. FALBO, L. BECHTOL	N: 212.02'	E: 65.21'	
GROUND SURFACE ELEV.: 671.63'	GWL DATE/TIME: 10-16-89	GWL DEPTH: 55.33'	
DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS		EQUIPMENT: CME-55	
CONTRACTOR: BOWSER-MORNER, INC.		CHECKED BY: J. BURDICK	

ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	[illegible]	REMARKS
	0.00	S 1	18-18-20-30	1.5		Dense, brown, well graded, fine to medium SAND with gravel - dry	sw		
670.0									
						3.5'			
						Medium dense, black, poorly graded, coarse SAND - wet			
	-5.00	S 2	10-20-7-50/4	1.5			sp		
665.0									
						8.5'			
						Loose, brown, silty, medium SAND with gravel - moist			
	-10.00	S 3	3-3-6-6	0.5			sm		
660.0									
						13.5'			
						Medium dense to dense, brown, well graded, medium to coarse SAND with gravel - moist			
	-15.00	S 4	5-6-7-8	0.67					
655.0									
	-20.00	S 5	8-9-14-18	1.33					
[illegible].0									
	-25.00	S 6	10-11-14-14	0.0					
645.0							sw		
	-30.00	S 7	11-12-13-14	1.5					
640.0									
	-35.00	S 8	12-14-20-22	1.83					
635.0									
	-40.00								

PROJECT NO: 303409 **BORING NO:** MW-120 **PROJECT NAME:** PPG-NATRIUM

DATE BEGAN: 9-21-89 **DATE FINISHED:** 9-21-89 **FIELD ENGINEER:** D. MARCUM

DRILLER: J. FALBO, L. BECHTOL **N:** 212.02' **E:** 65.21'

GROUND SURFACE ELEV.: 671.63' **GWL DATE/TIME:** 10-16-89 **GWL DEPTH:** 55.33'

DRILLING METHOD: 4 1/4" ID HOLLOW STEM AUGERS **EQUIPMENT:** CME-55

CONTRACTOR: BOWSER-MORNER, INC. **CHECKED BY:** J. BURDICK

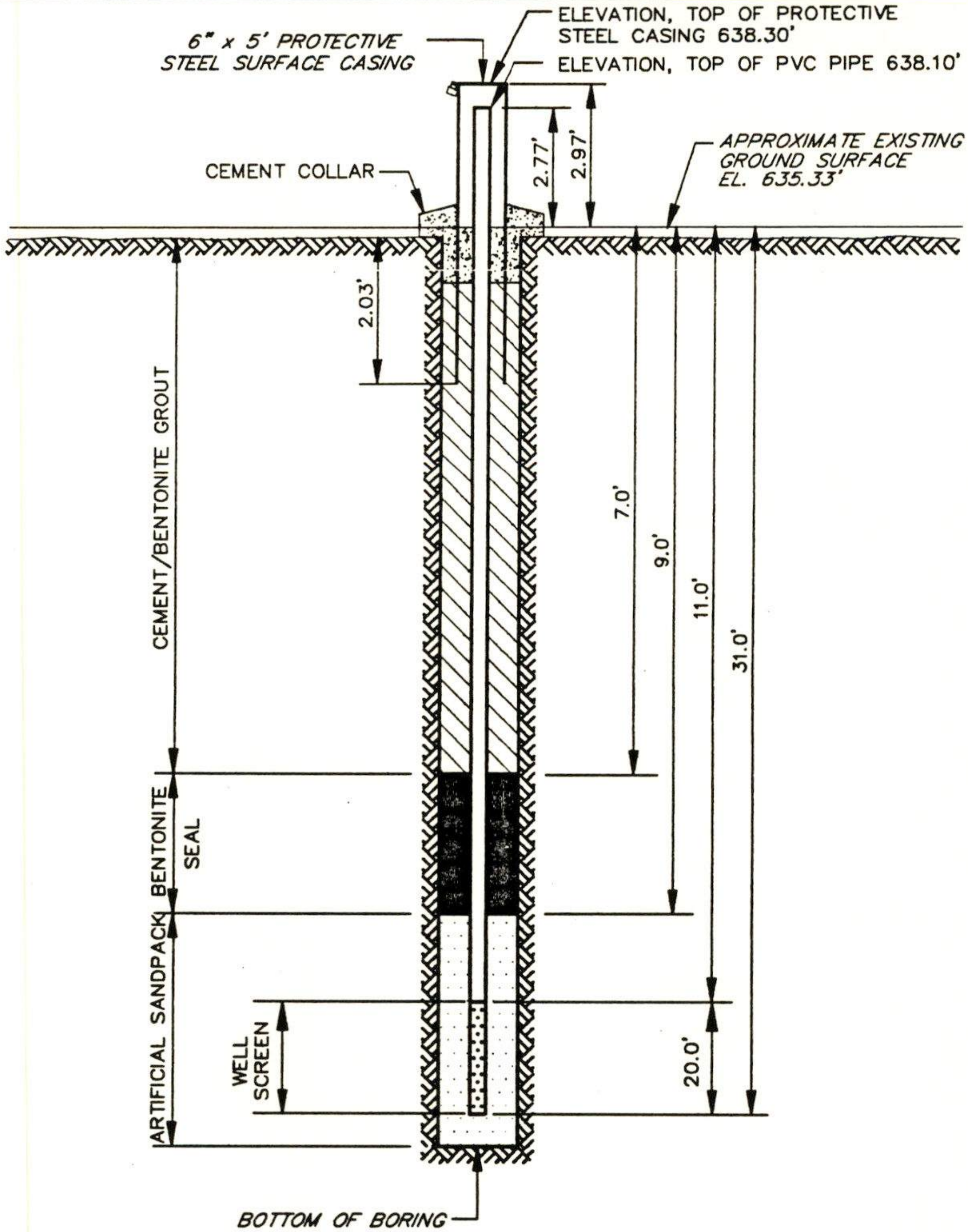
ELEV (FT)	DEPTH (FT)	SAMPLE TYPE AND NO.	SPT BLOWS PER (0.5')	REC (FT)	PROFILE	DESCRIPTION	USCS	[illegible]	REMARKS
630.0	40.00	S 9	10-10-13-14	1.67			SW		
						43.5'			
625.0	45.00	S 10	10-10-12-16	1.5		Medium dense, brown, poorly graded fine SAND - moist	SP		
						48.5'			
620.0	50.00	S 11	19-20-31-50/4	1.5		Dense, to very dense, brown, well graded, fine to medium SAND with gravel and cobble fragments - wet	SW		
▼ 615.0	55.00	S 12	19-20-21-22	1.67					GROUNDWATER NOTED AT 56.0' DURING DRILLING
1.0	60.00	S 13	15-18-25-31	1.33					
605.0	65.00	S 14	20-22--25-32	1.75					
	70.00	S 15	4-4-7-7	1.42					
600.0						BOTTOM OF BORING AT 71.0'			SPLIT-SPOON SAMPLES COLLECTED BY STANDARD ASTM METHODS
595.0	75.00								
	80.00								

APPENDIX B

AS-BUILT
MONITORING WELL CONSTRUCTION DIAGRAMS

DRAWING NUMBER 303409–A14

DRAWN BY	KME	11–14–89
CHECKED BY	JMB	7·16·92
APPROVED BY	JMB	4 AUG 92



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH–JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 624.21'.
5. WATER LEVEL READING ON 10–16–89.

AS–BUILT
INSTALLATION DETAILS
MONITORING WELL MW–100
NATRIUM SITE

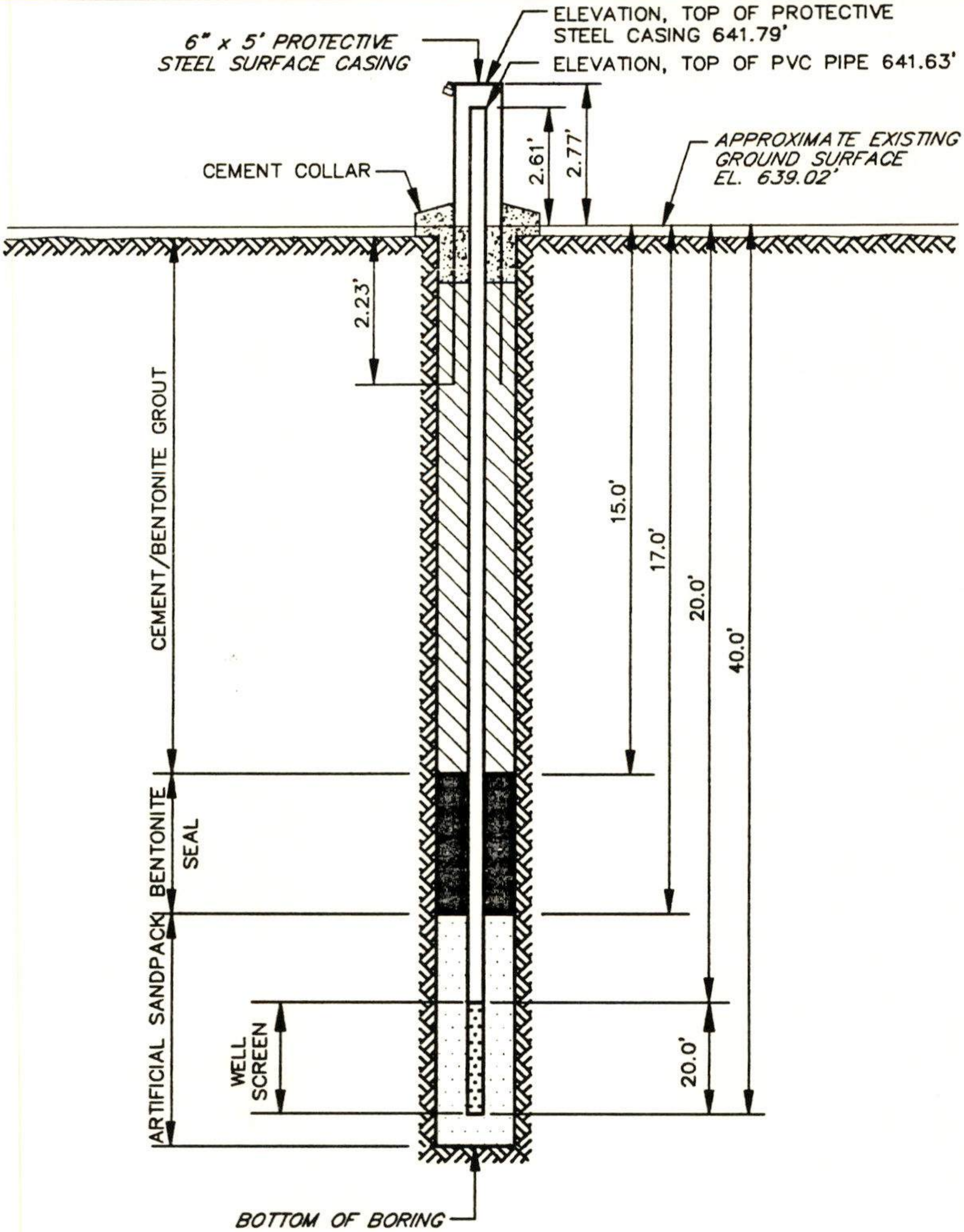
PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

6380

"Do Not Scale This Drawing"



DRAWING NUMBER 303409-A15

DRAWN BY	KME	11-14-89
CHECKED BY	JMB	7-16-92
APPROVED BY	JMB	4 AUG 92

NOTES:

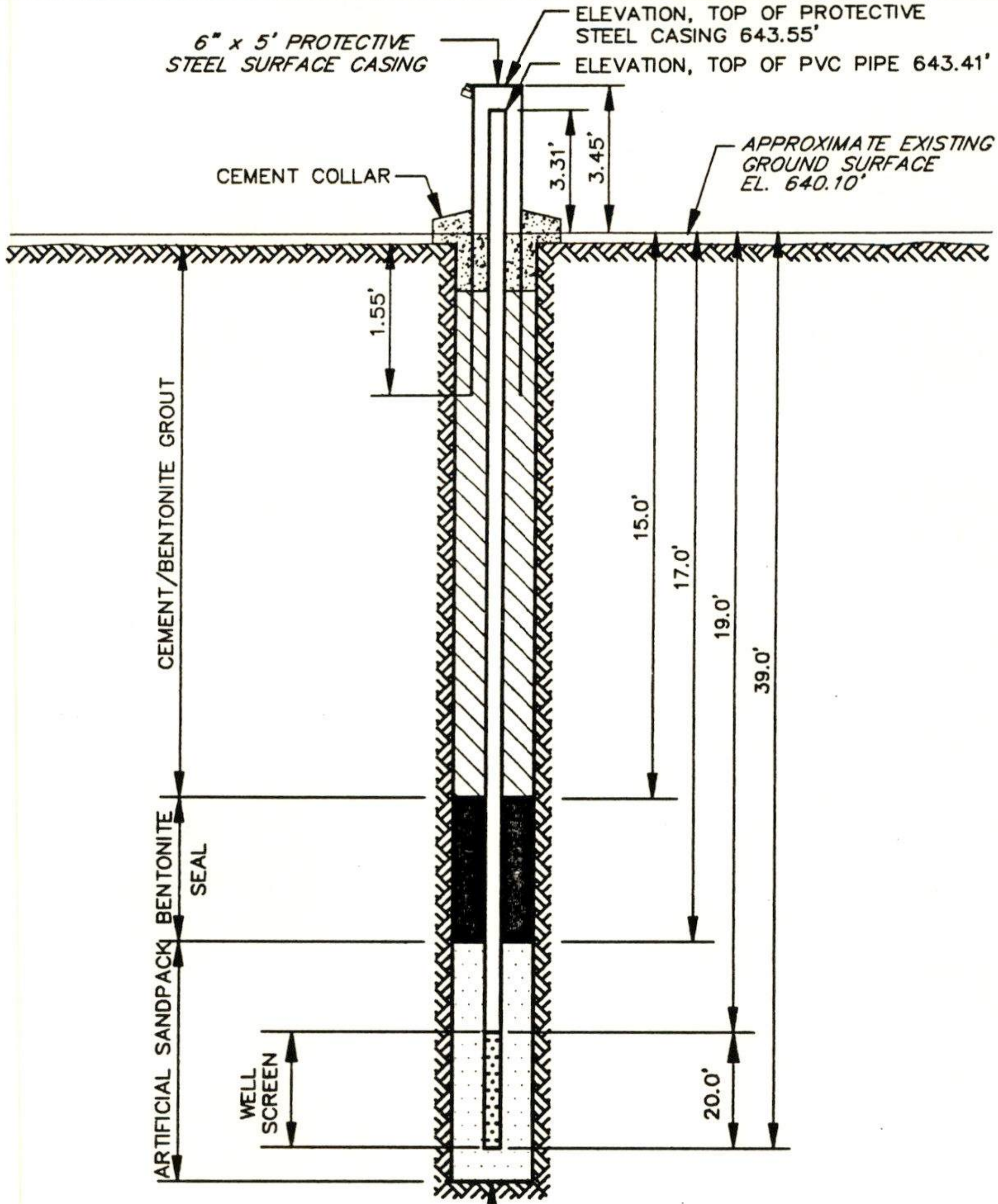
1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 615.98'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-101
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 615.68'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-102
NATRIUM SITE

PREPARED FOR

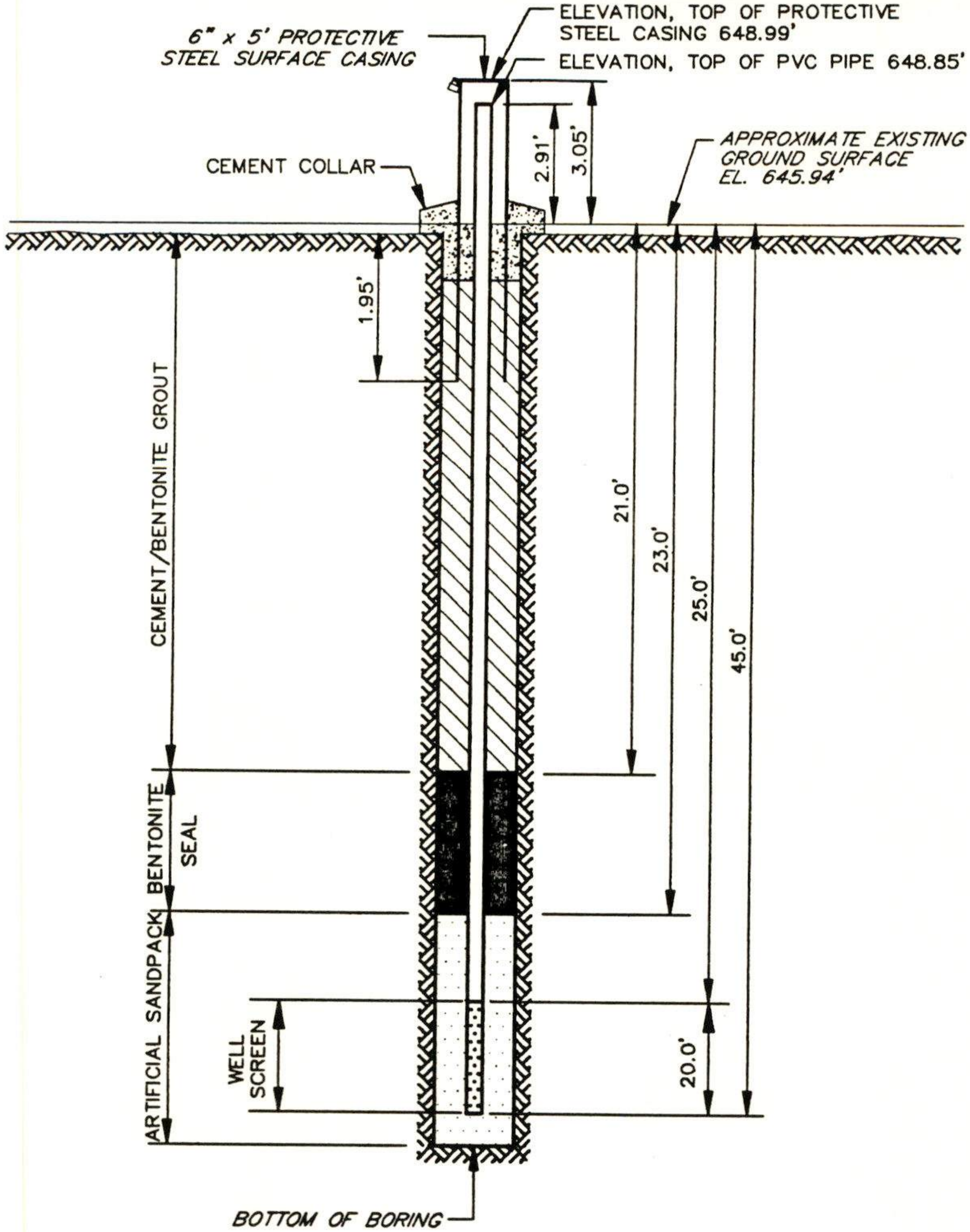
PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
KME 11-14-89	JMB 7-16-92	JMB 4 AUG 92	303409-A16

65360

"Do Not Scale This Drawing"



DRAWN BY: KME 11-14-89
CHECKED BY: JMB 7-16-92
APPROVED BY: JMB 7-16-92
DRAWING NUMBER: 303409-A17

NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 618.18'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-103
NATRIUM SITE

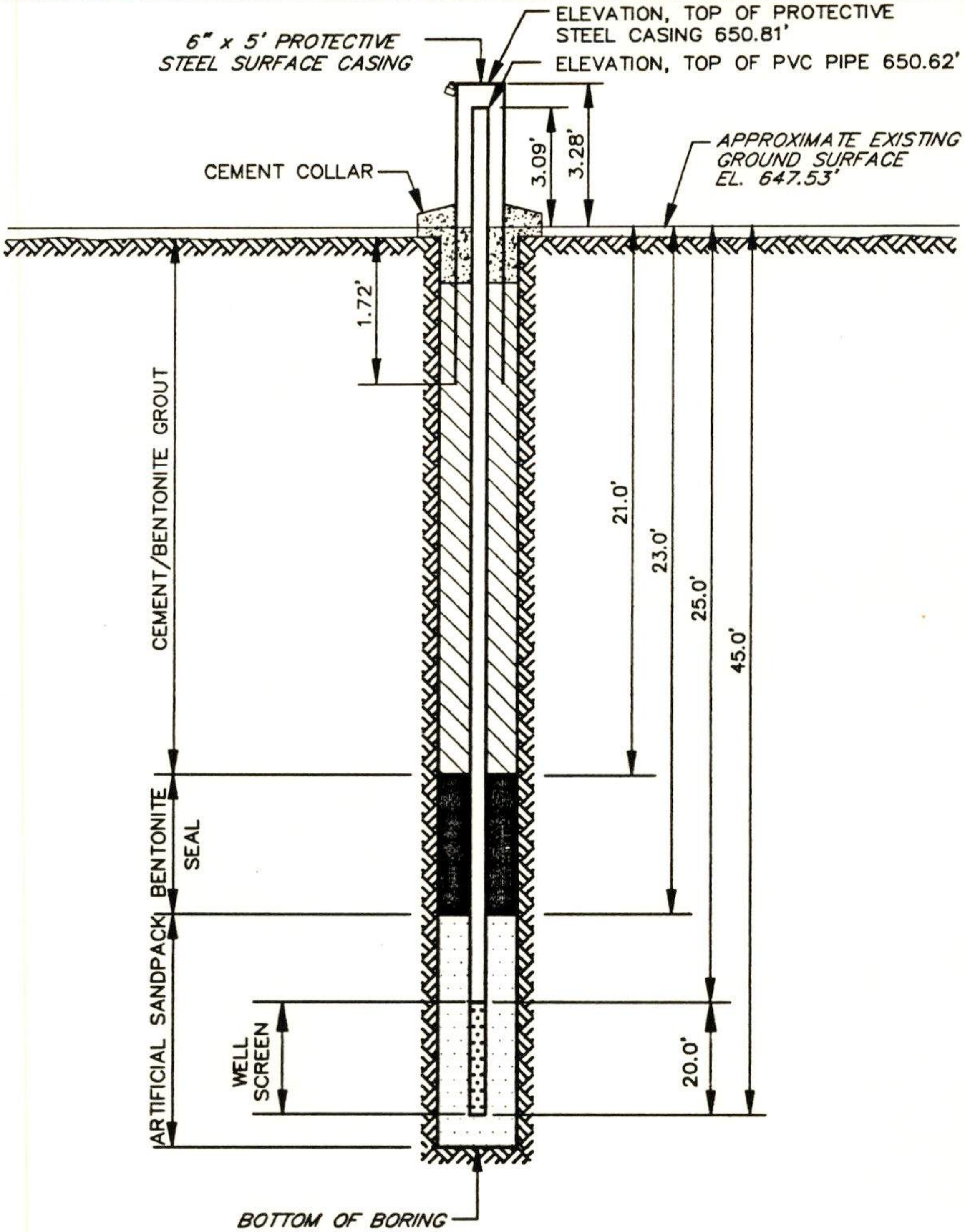
PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

65380

"Do Not Scale This Drawing"



DRAWING NUMBER 303409-A18

DRAWN BY KME 11-14-89

CHECKED BY JMB 7-16-92

APPROVED BY

NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 617.31'.
5. WATER LEVEL READING ON 10-16-89.

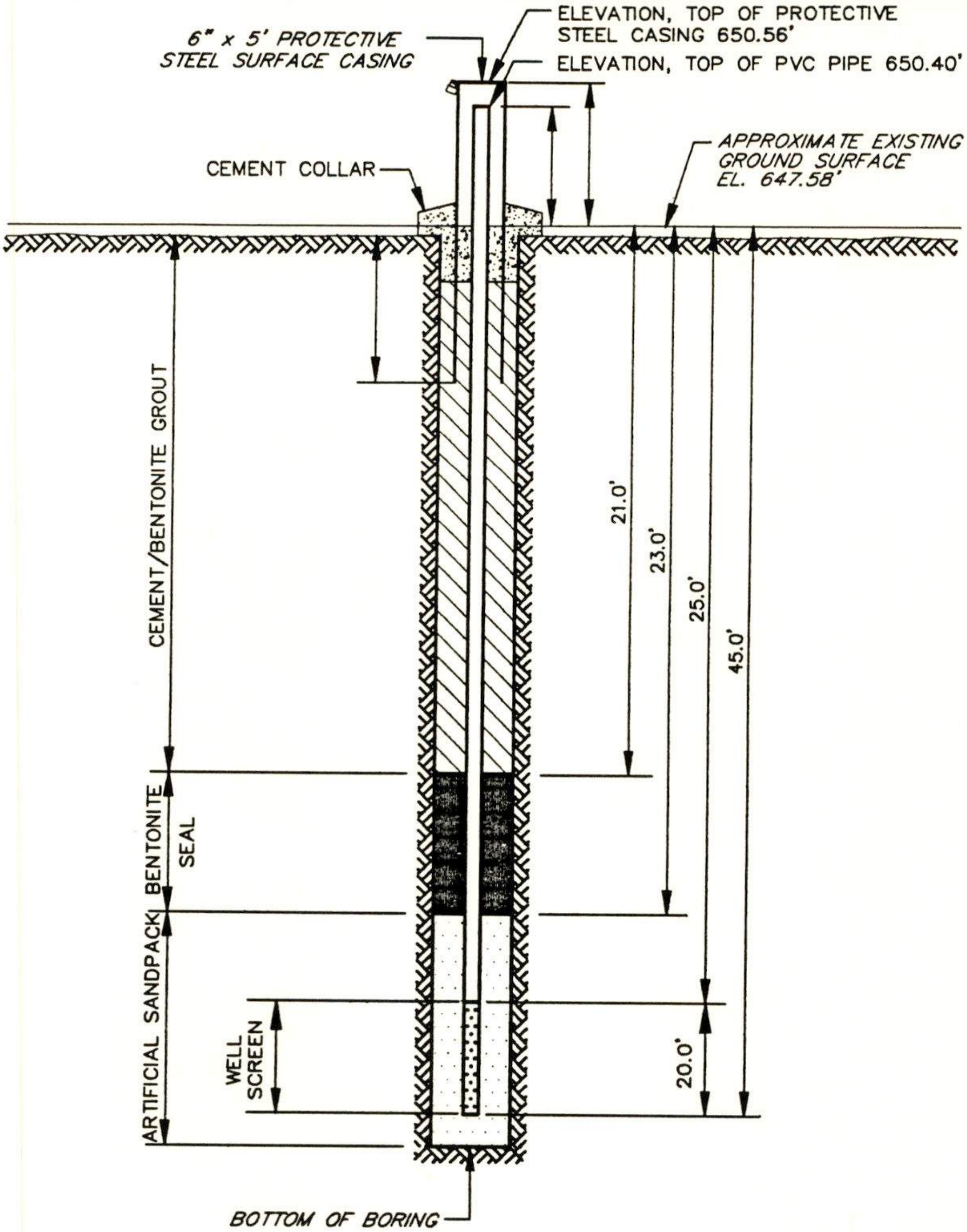
AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-104
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

85380



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 618.18'.
5. WATER LEVEL READING ON 10-16-89.

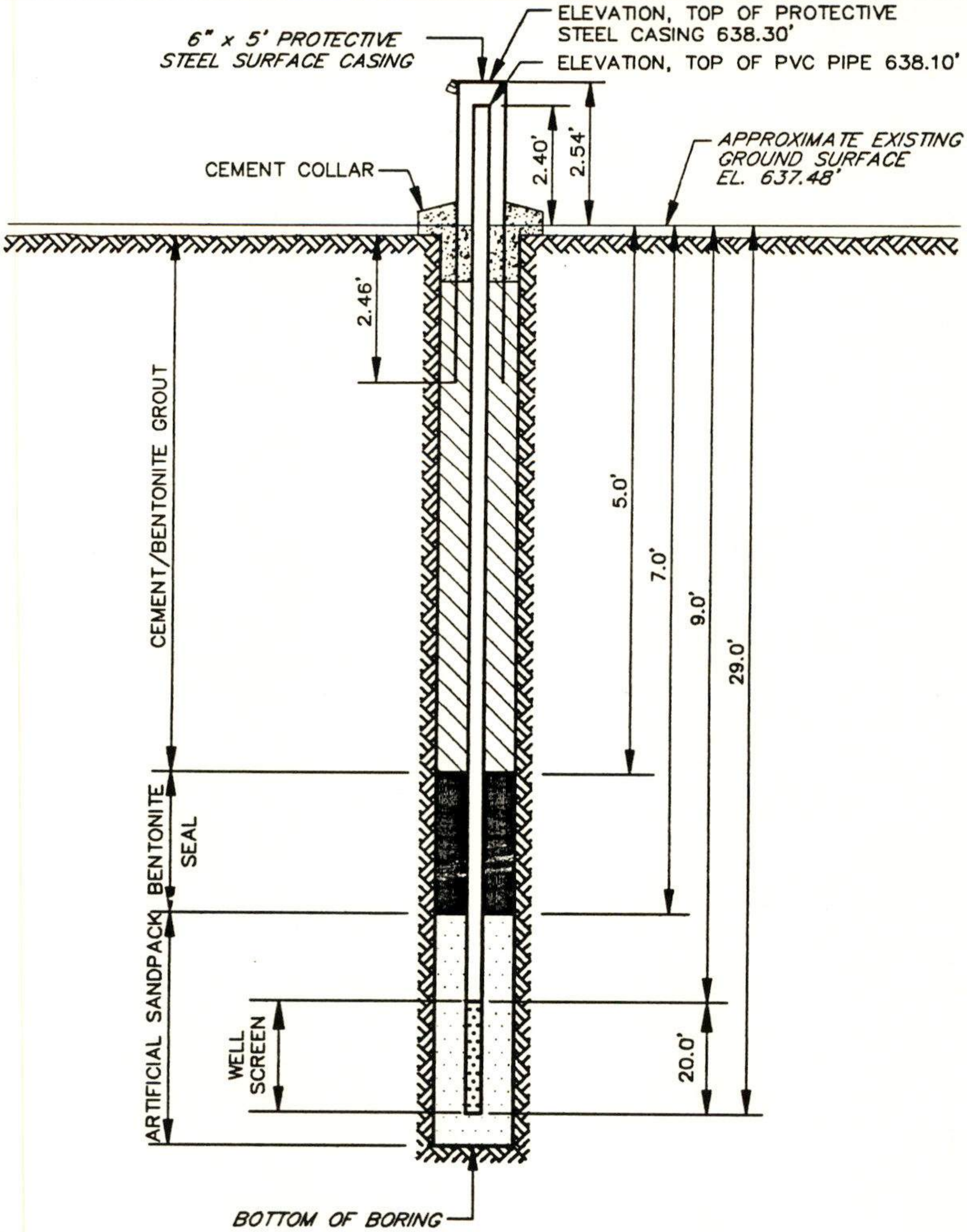
AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-105
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY	KME	11-14-89
CHECKED BY	JMB	7-16-92
APPROVED BY	JMB	
DRAWING NUMBER	303409-A19	



DRAWING NUMBER 303409-A8

DRAWN BY KME 11-14-89

CHECKED BY JMB 7-16-92

APPROVED BY

NOTES:

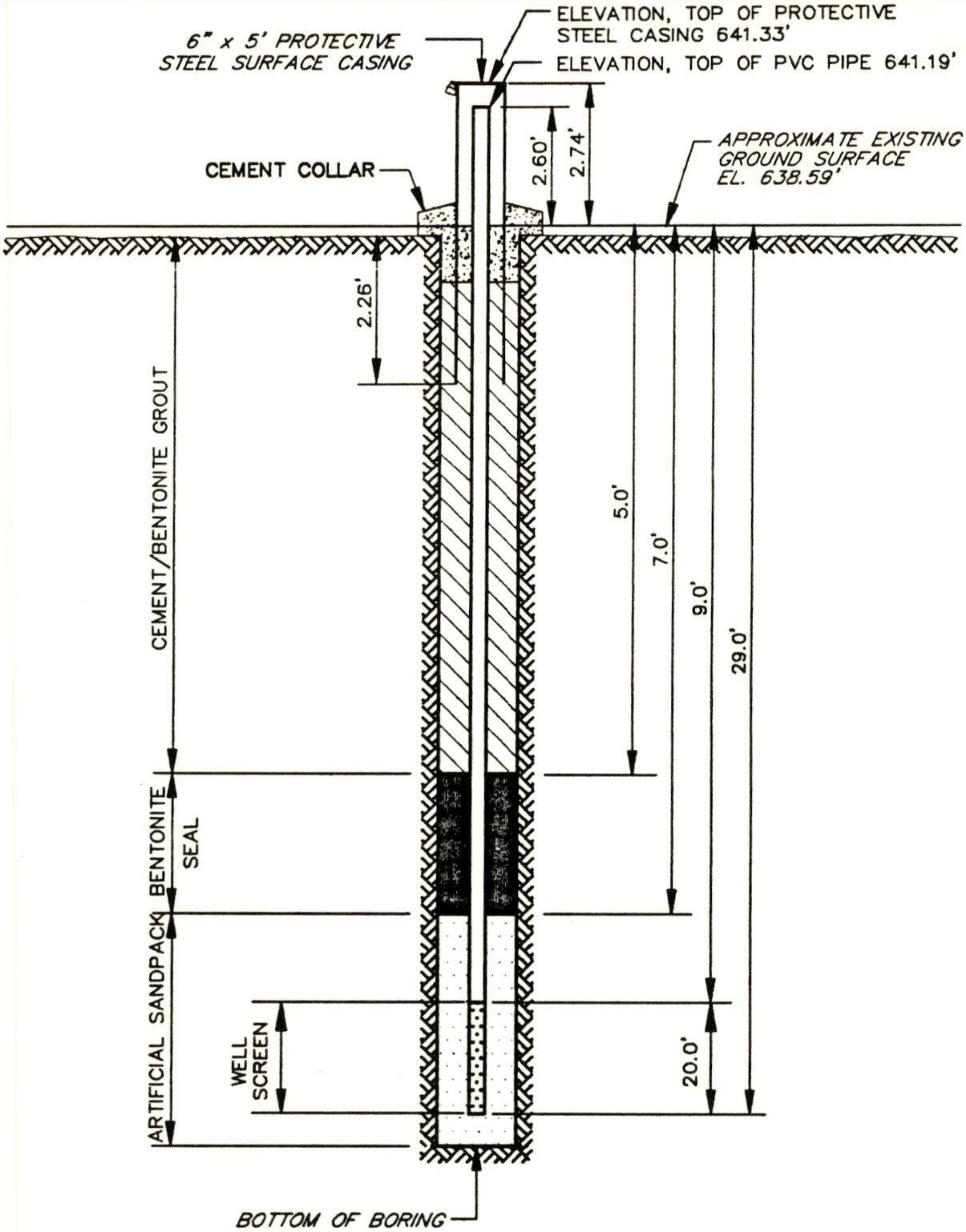
1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 616.63'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-106
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH–JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 616.58'.
5. WATER LEVEL READING ON 10–16–89.

AS–BUILT
INSTALLATION DETAILS
MONITORING WELL MW–107
NATRIUM SITE

PREPARED FOR

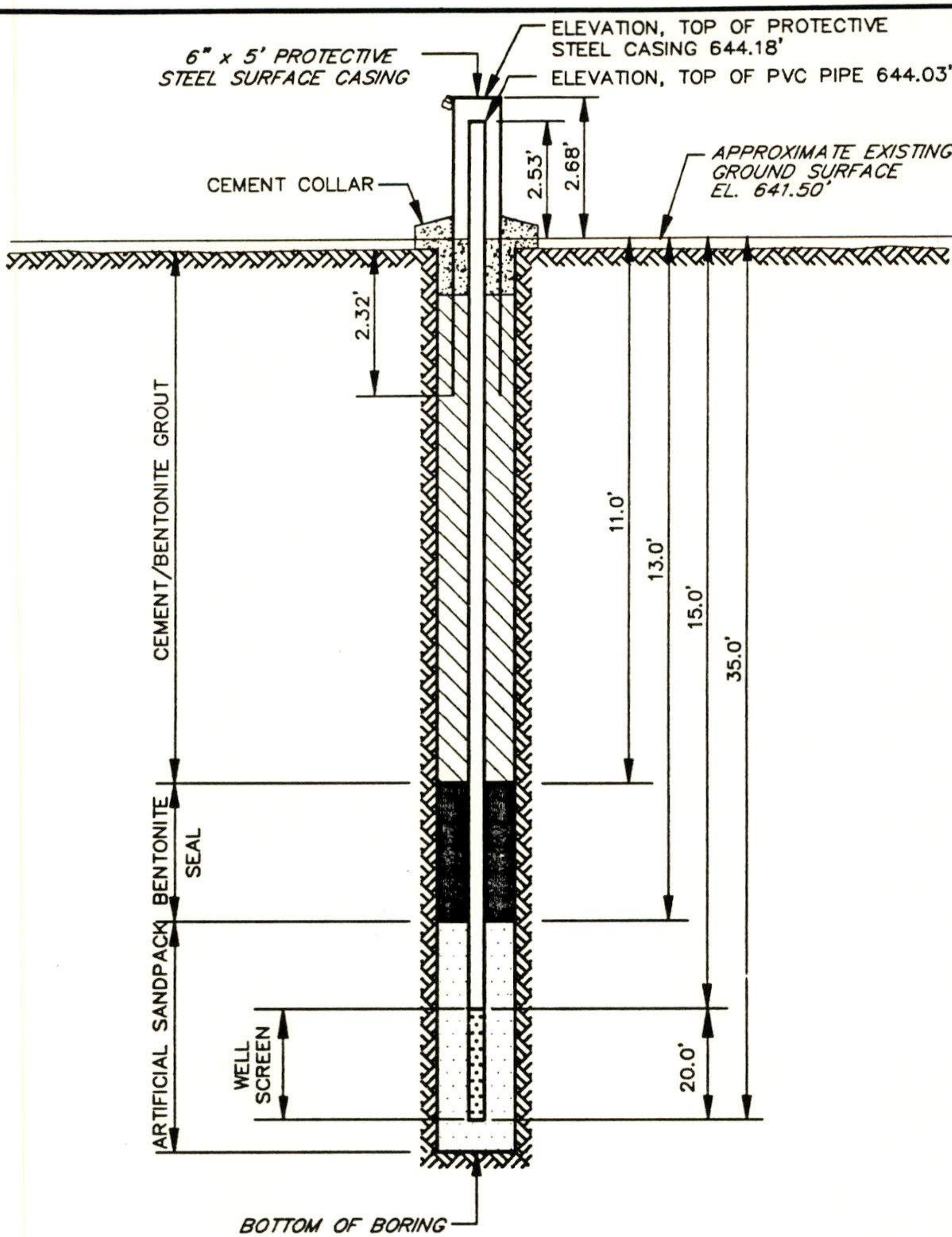
PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY	KME	11–14–89
CHECKED BY	JMB	7-16-92
APPROVED BY	JAB	4AUG92
DRAWING NUMBER	303409–A9	

"Do Not Scale This Drawing"

65360



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 615.78'.
5. WATER LEVEL READING ON 10-16-89.

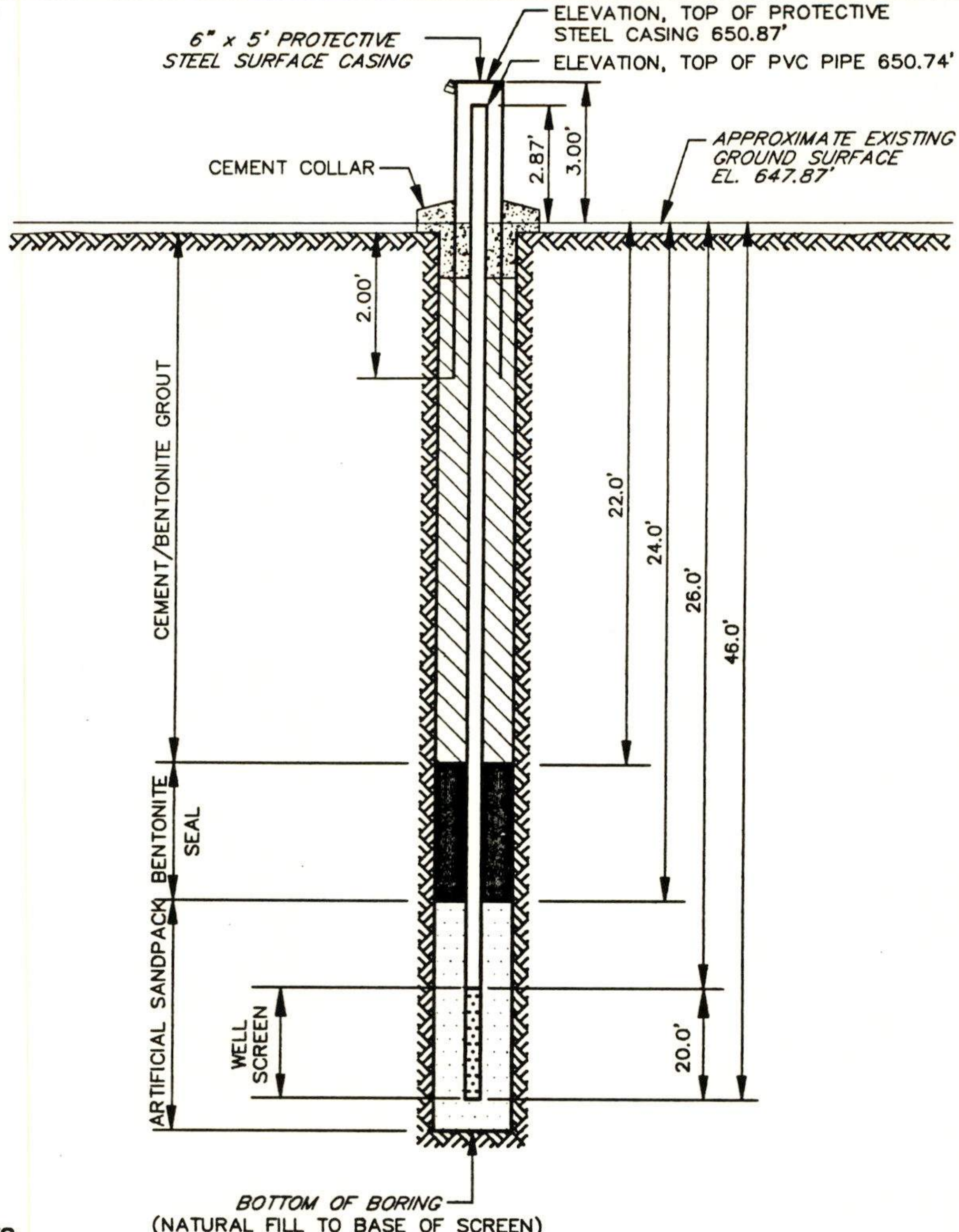
AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-108
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY	CHECKED BY		DRAWING NUMBER
KME	JMB	7-16-92	303409-A10
11-14-89	APPROVED BY	JMB	



DRAWN BY: KME 11-14-89
CHECKED BY: JMB 7-16-92
APPROVED BY: STB
DRAWING NUMBER: 303409-A11

NOTES:

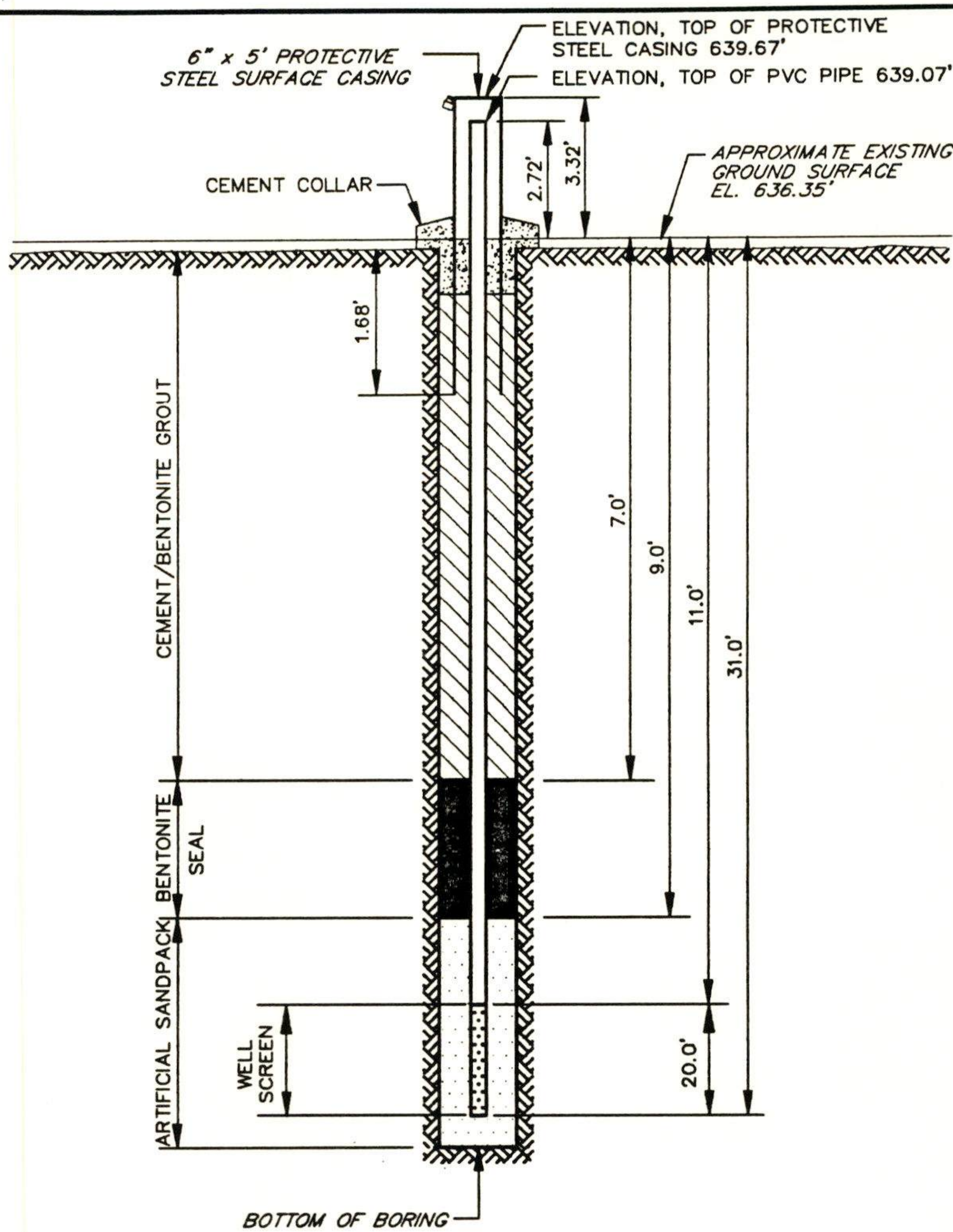
1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 615.70'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-109
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION



DRAWING NUMBER 303409-A20

DRAWN BY KME 11-14-89

CHECKED BY JMB 7-16-92

APPROVED BY

NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 622.72'
5. WATER LEVEL READING ON 10-16-89

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-110
NATRIUM SITE

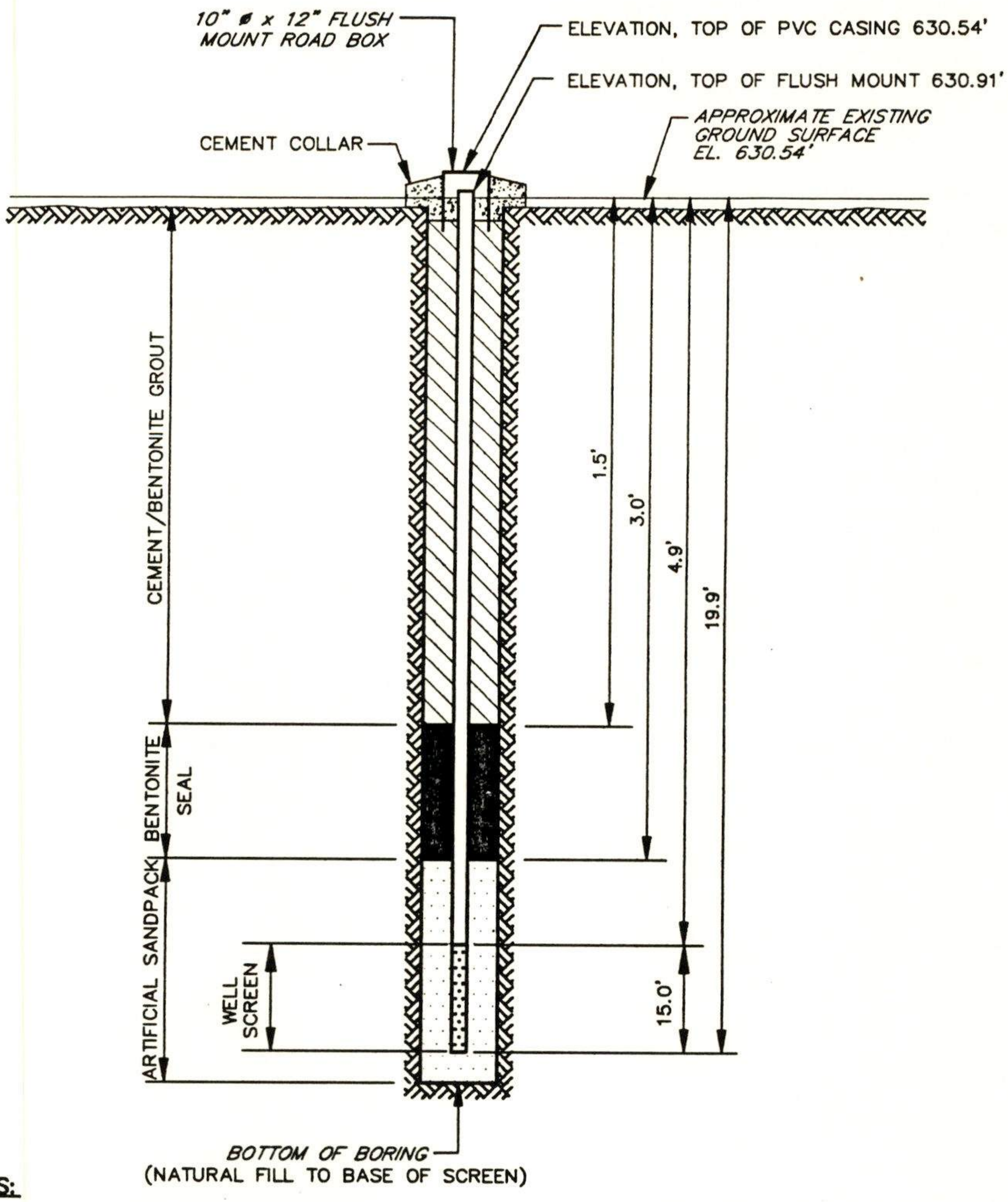
PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

65360

1:33 PM



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 624.47'.
5. WATER LEVEL READING ON 10-16-89.

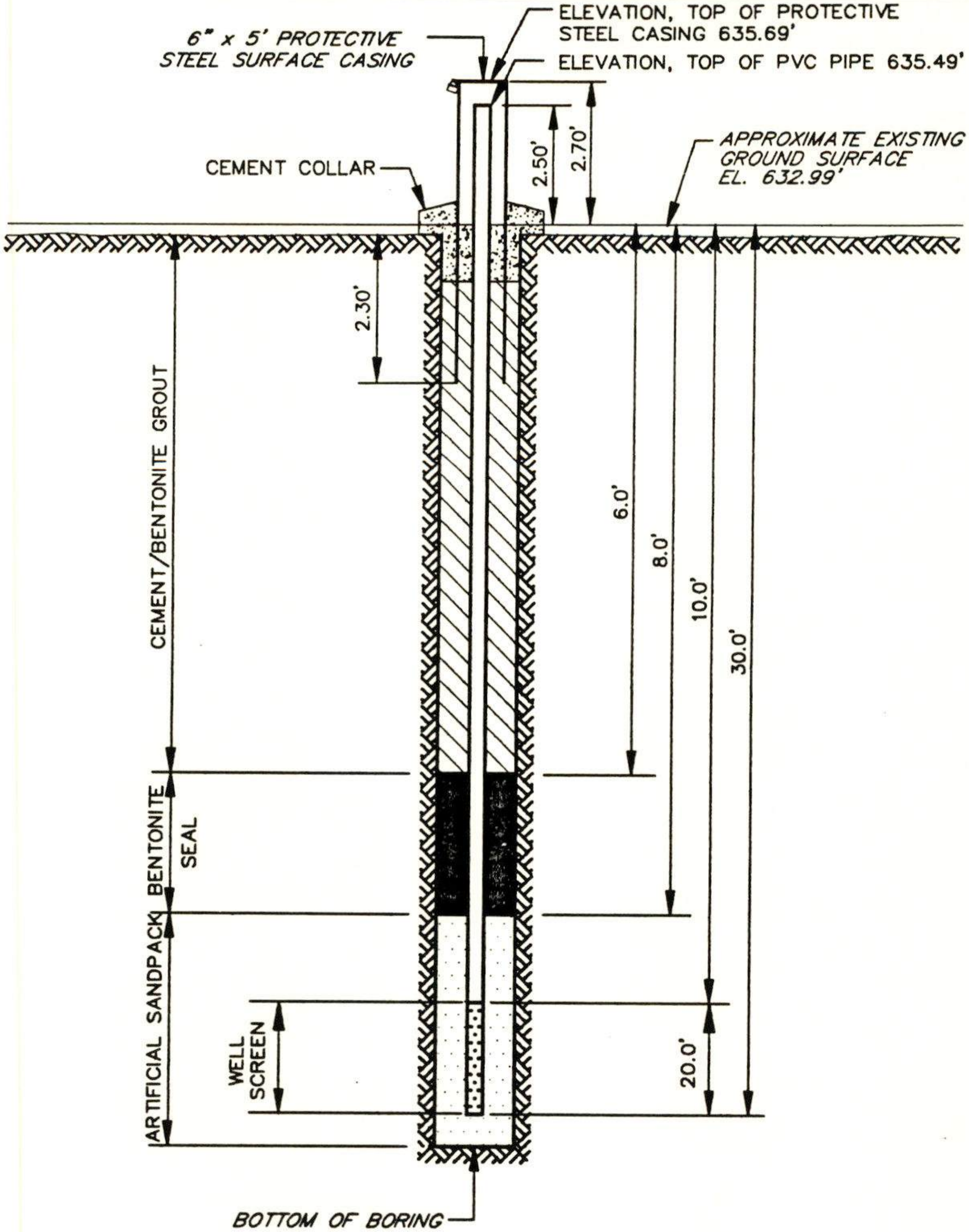
AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-111
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY	CHECKED BY	DRAWING NUMBER
KME 11-14-89	JMB 7-16-92	303409-A21
	APPROVED BY JMB	



DRAWING NUMBER 303409-A22

DRAWN BY KME 11-14-89 | CHECKED BY JMB 7-16-92 | APPROVED BY JMB 4/24/6.92

NOTES:

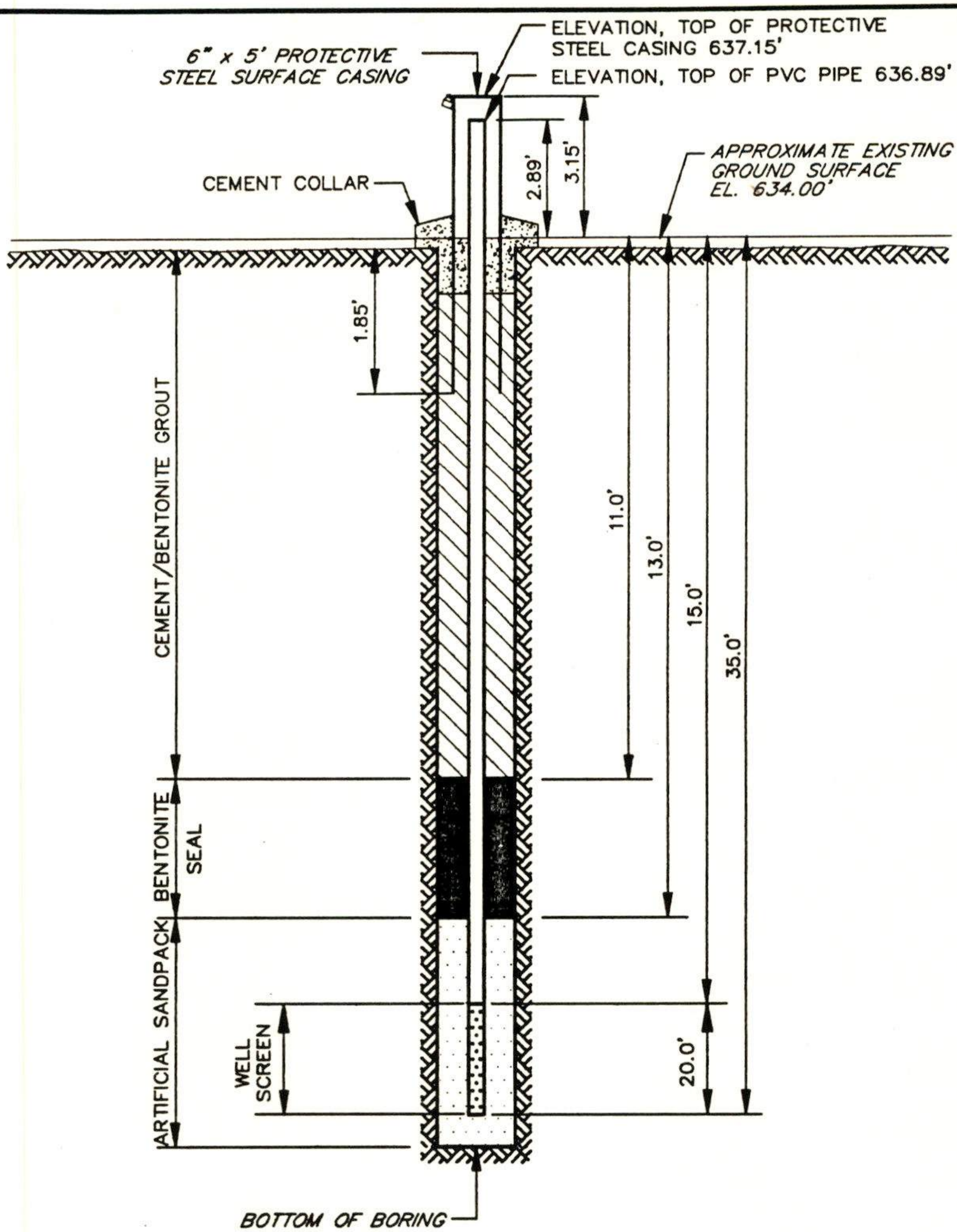
1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 625.12'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-112
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION



DRAWN BY | KME 11-14-89 | CHECKED BY | APPROVED BY | JMB | 7-16-92 | DRAWING NUMBER 303409-A23

NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 623.59'.
5. WATER LEVEL READING ON 10-16-89.

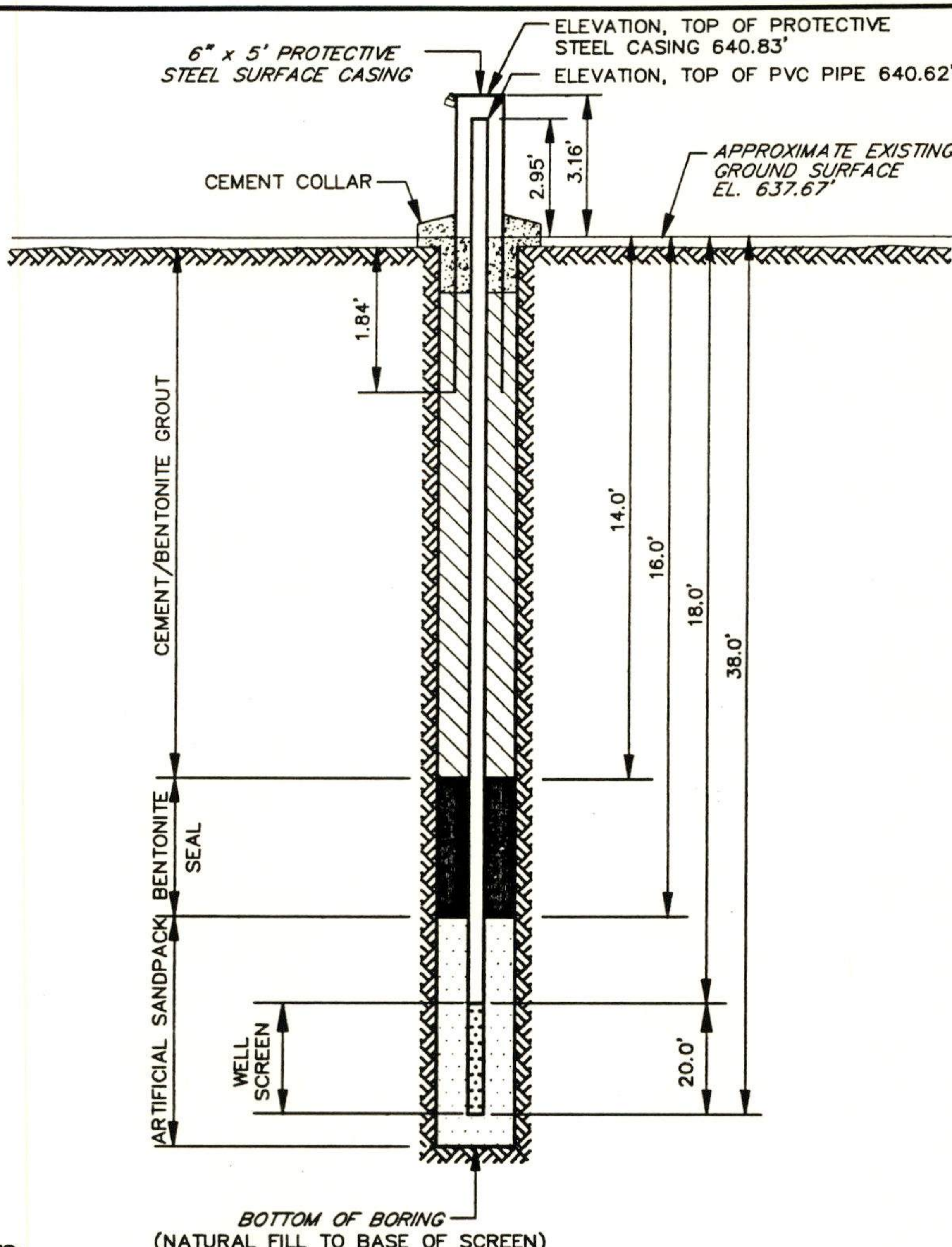
AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-113
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY KME 11-14-89 | CHECKED BY JMB 7-16-92 | APPROVED BY JMB 4/21/93 | DRAWING NUMBER 303409-A24



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 615.34'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-114
NATRIUM SITE

PREPARED FOR

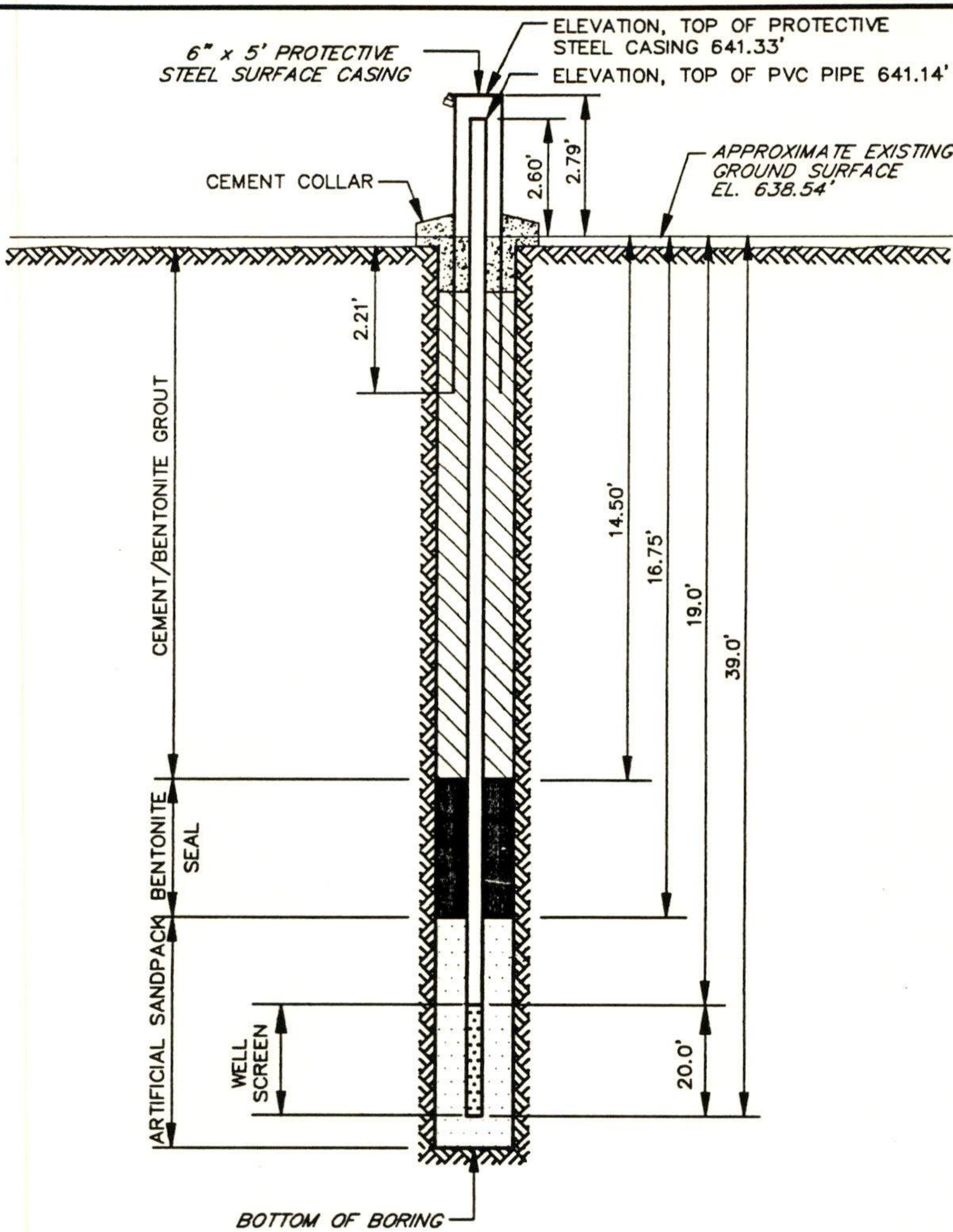
PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

65360

"Do Not Scale This Drawing"

DRAWN BY	KME 11-14-89	C KED BY / A VED BY	JMB 1-16-92 / JMB [illegible]
DRAWING NUMBER	303409-A25		



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 615.99'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-115
NATRIUM SITE

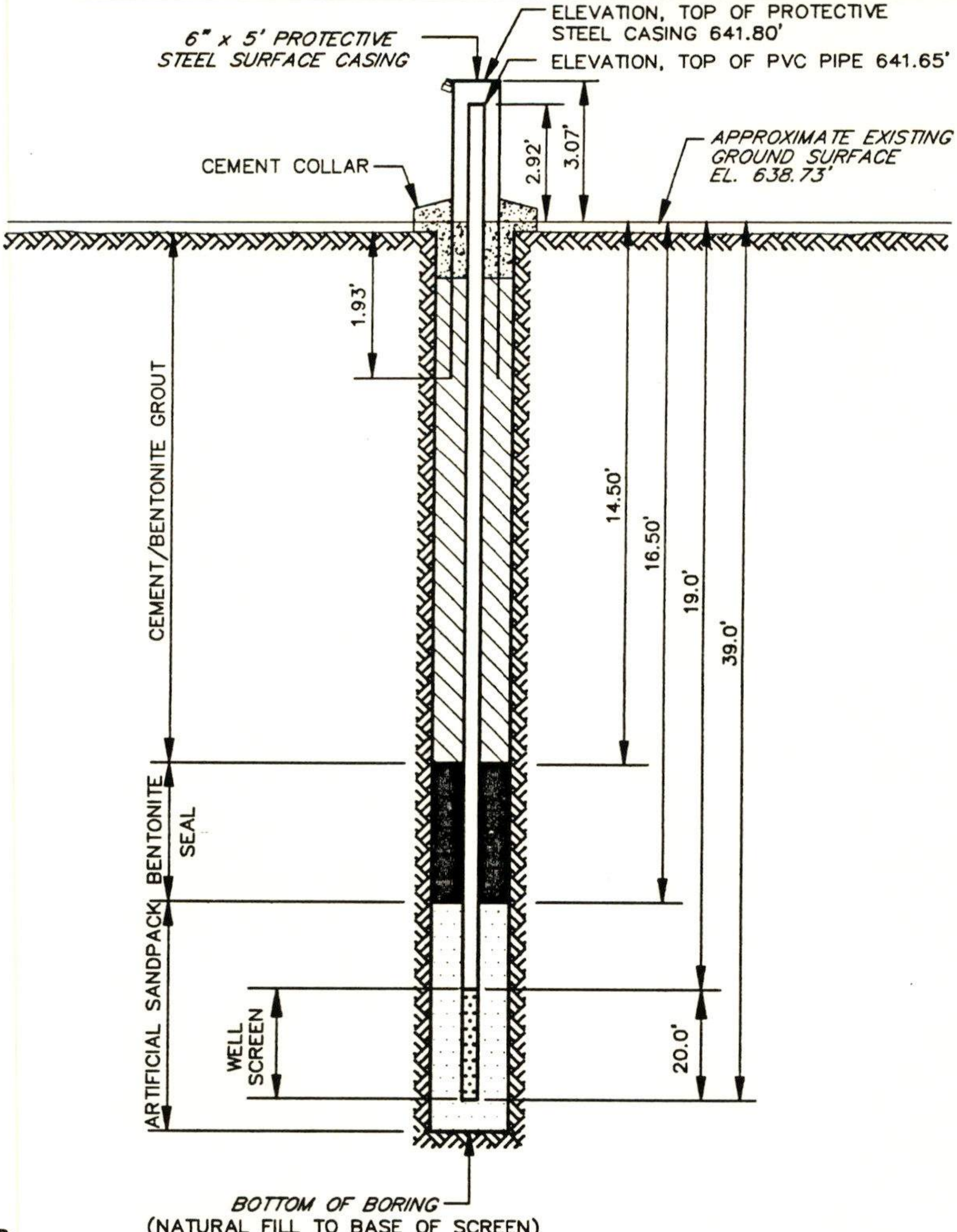
PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

65360

"Do Not Scale This Drawing"



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 615.59'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-116
NATRIUM SITE

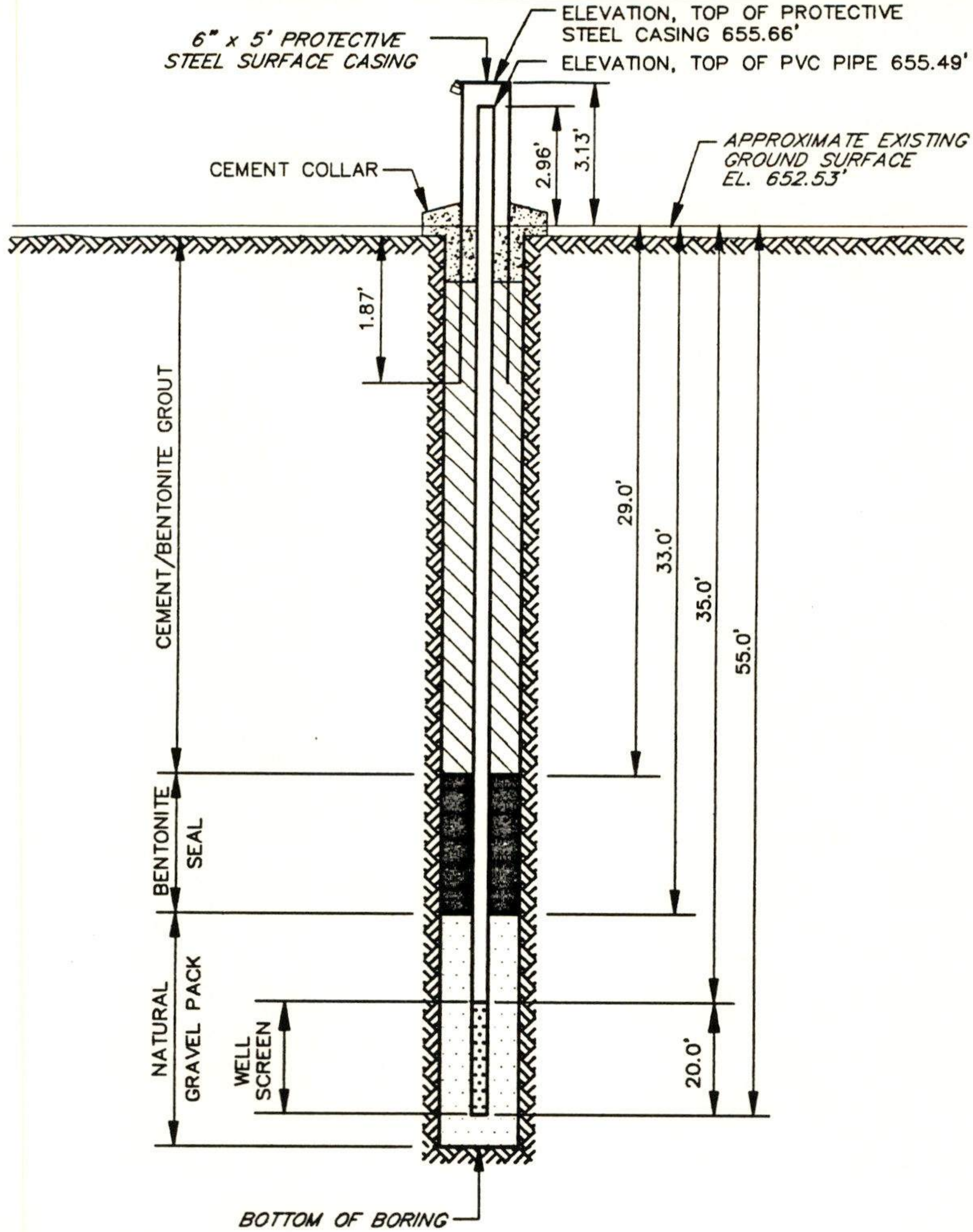
PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY	CHECKED BY	DRAWING NUMBER
KME 11-14-89	JMP 7-16-92	303409-A26
	APPROVED BY JJB 4 Aug 92	

65360



DRAWN BY	KME	11-14-89
CHECKED BY	JMB	7-16-92
APPROVED BY	JMB	7-16-92

DRAWING NUMBER 303409-A27

NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 615.27'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-117
NATRIUM SITE

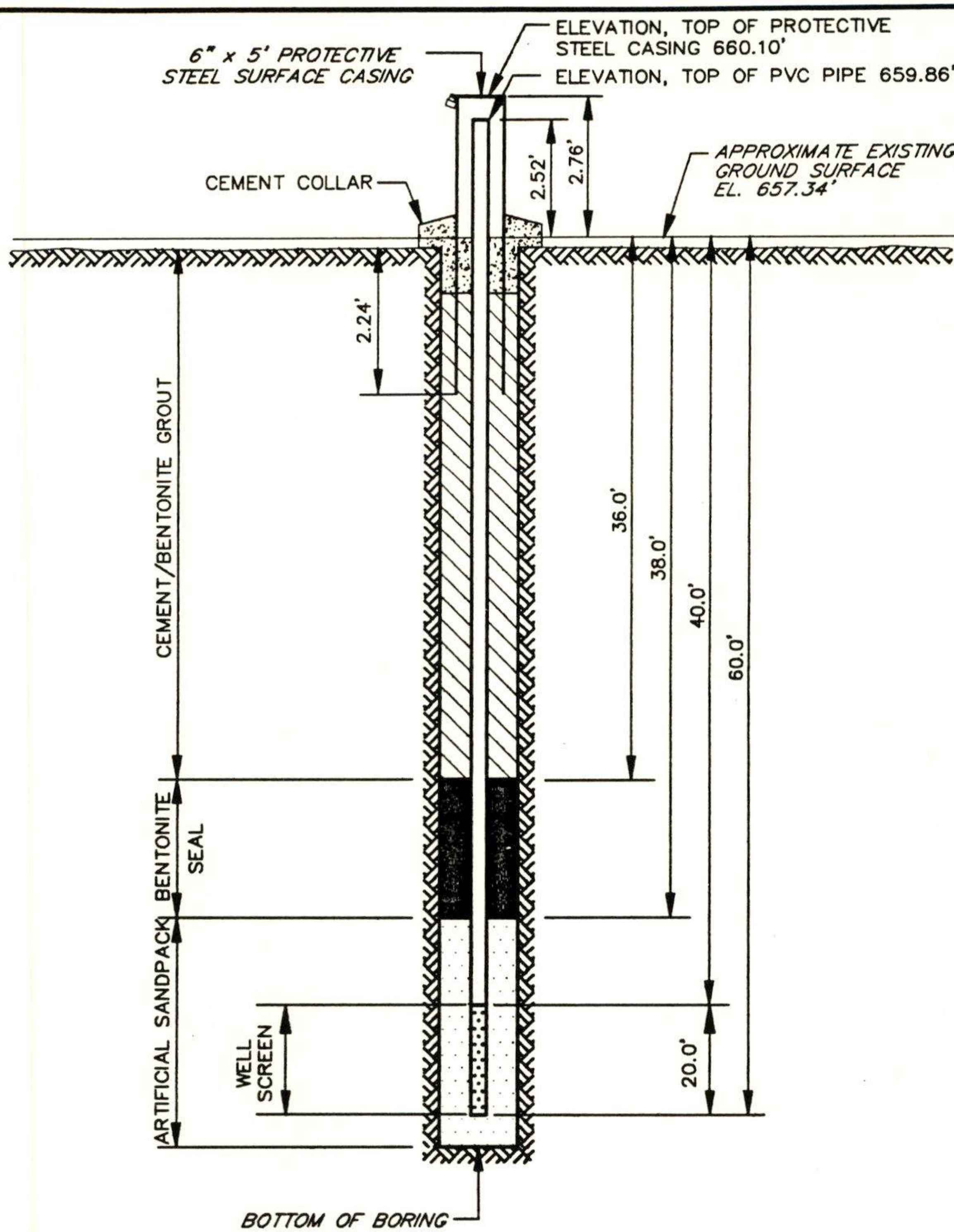
PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

65360

"Do Not Scale This Drawing"



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 616.25'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-118
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

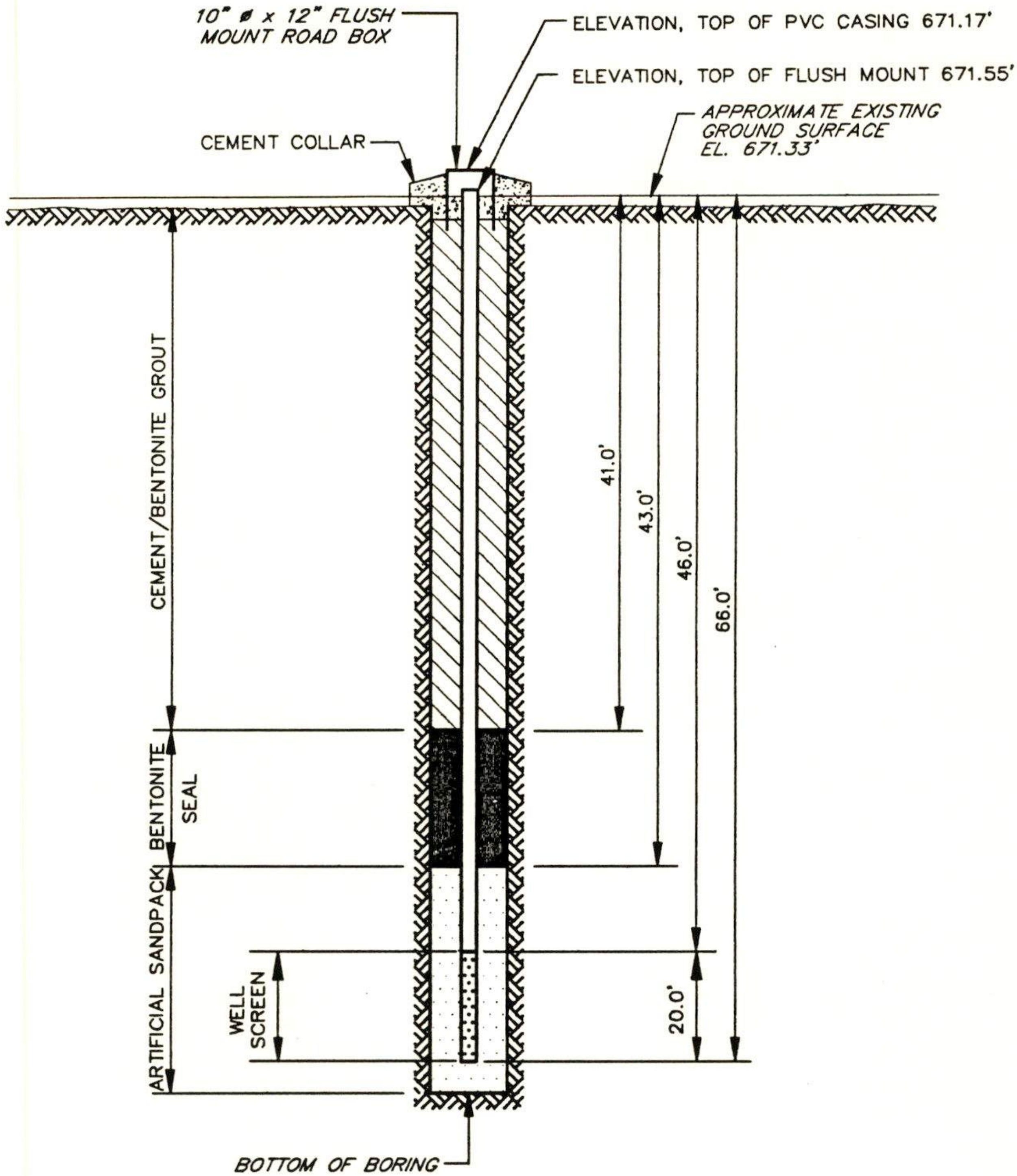
INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY KME 11-14-89 | CHECKED BY JMB 7-16-92 | APPROVED BY JMB 8-6-92 | DRAWING NUMBER 303409-A28

65360

"Do Not Scale This Drawing"

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
KME 11-14-89	JMB 7 16 92	JMB 4AUG92	303409-A29



NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 616.21'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT INSTALLATION DETAILS MONITORING WELL MW-119

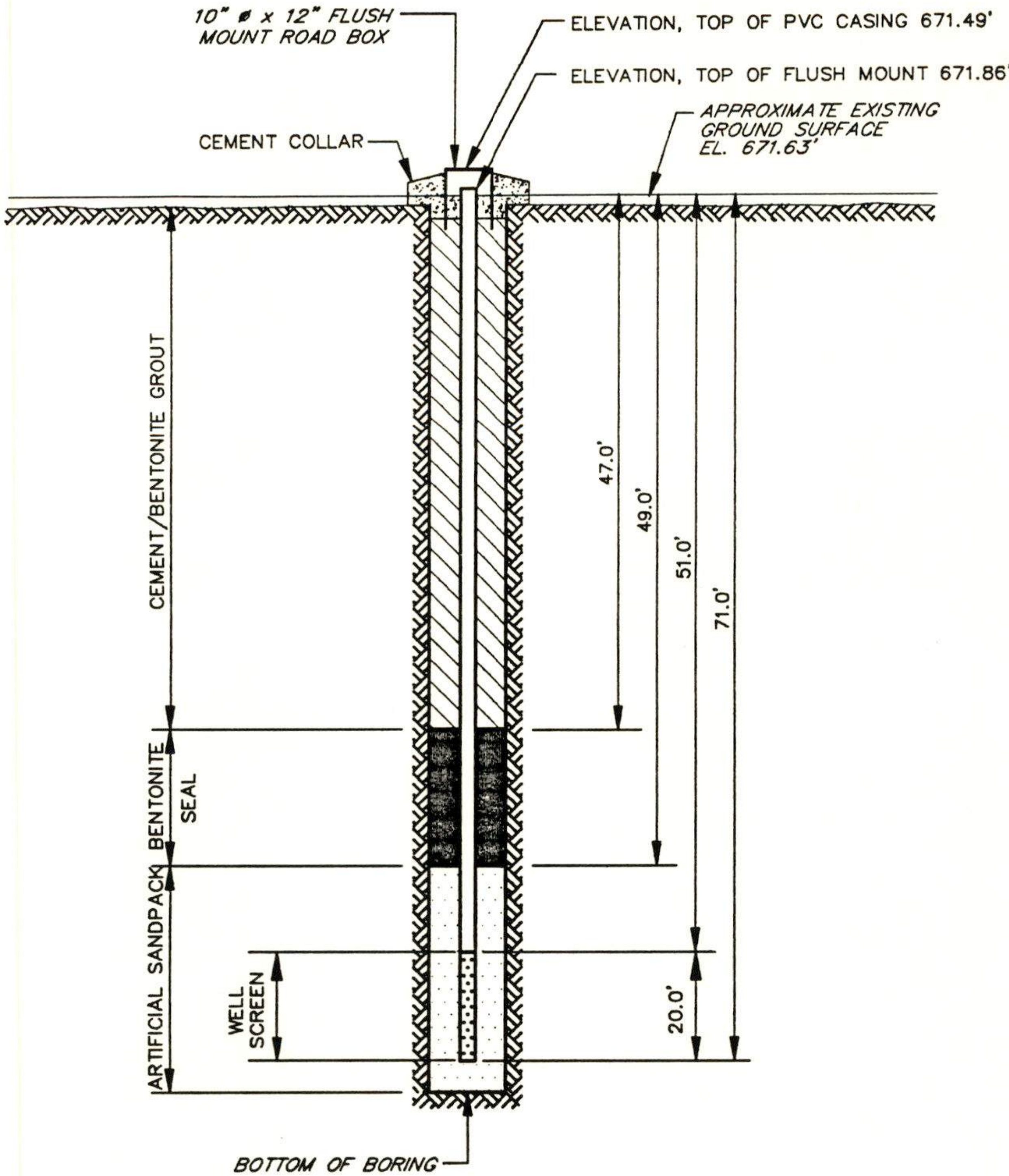
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

85360



DRAWING NUMBER 303409-A30

DRAWN BY	CHECKED BY	APPROVED BY
KME 11-14-89	JMB 7-16-92	JMB 4 AUG 92

NOTES:

1. RISER PIPE IS 2 IN. I.D. SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2 IN I.D. PVC PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 616.30'.
5. WATER LEVEL READING ON 10-16-89.

AS-BUILT
INSTALLATION DETAILS
MONITORING WELL MW-120
NATRIUM SITE

PREPARED FOR

PPG INDUSTRIES, INC.
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL TECHNOLOGY CORPORATION

65360

"Do Not Scale This Drawing"

APPENDIX C

FILTER PACK MATERIAL GRAIN SIZE ANALYSIS

WASH SIEVE ANALYSIS

Client	IT CORP	Tested By TO	Date 10-23-89
Client Project	PPG NATRIUM	Checked By JCM	Date 10-26-89
Project No.	89215		
Boring No.	NA		
Depth(ft.)	NA		
Sample No.	MW-104		

Visual Description GRAYISH WHITE COARSE SAND

Wt. of Total Sample(dry) 419.99gm.
Wt. of +#200 Sample 415.91gm.
Wt. of -#200 Sample 4.08gm.

Sieve	Sieve Opening (mm)	Wt. of Soil Retained (gm.)	Percent Retained	Accumulated Percent Retained	Percent Finer
3"	75.00	0.00	0.00	0.00	100.0
1 1/2"	37.50	0.00	0.00	0.00	100.0
3/4"	19.00	0.00	0.00	0.00	100.0
3/8"	9.50	0.00	0.00	0.00	100.0
#4	4.75	0.00	0.00	0.00	100.0
#10	2.00	57.52	13.70	13.70	86.3
#20	0.85	268.05	63.82	77.52	22.5
#40	0.425	61.28	14.59	92.11	7.9
#60	0.250	21.60	5.14	97.25	2.7
#140	0.106	7.03	1.67	98.93	1.1
#200	0.075	0.43	0.10	99.03	1.0
Pan	-	4.08	0.97	100.00	-

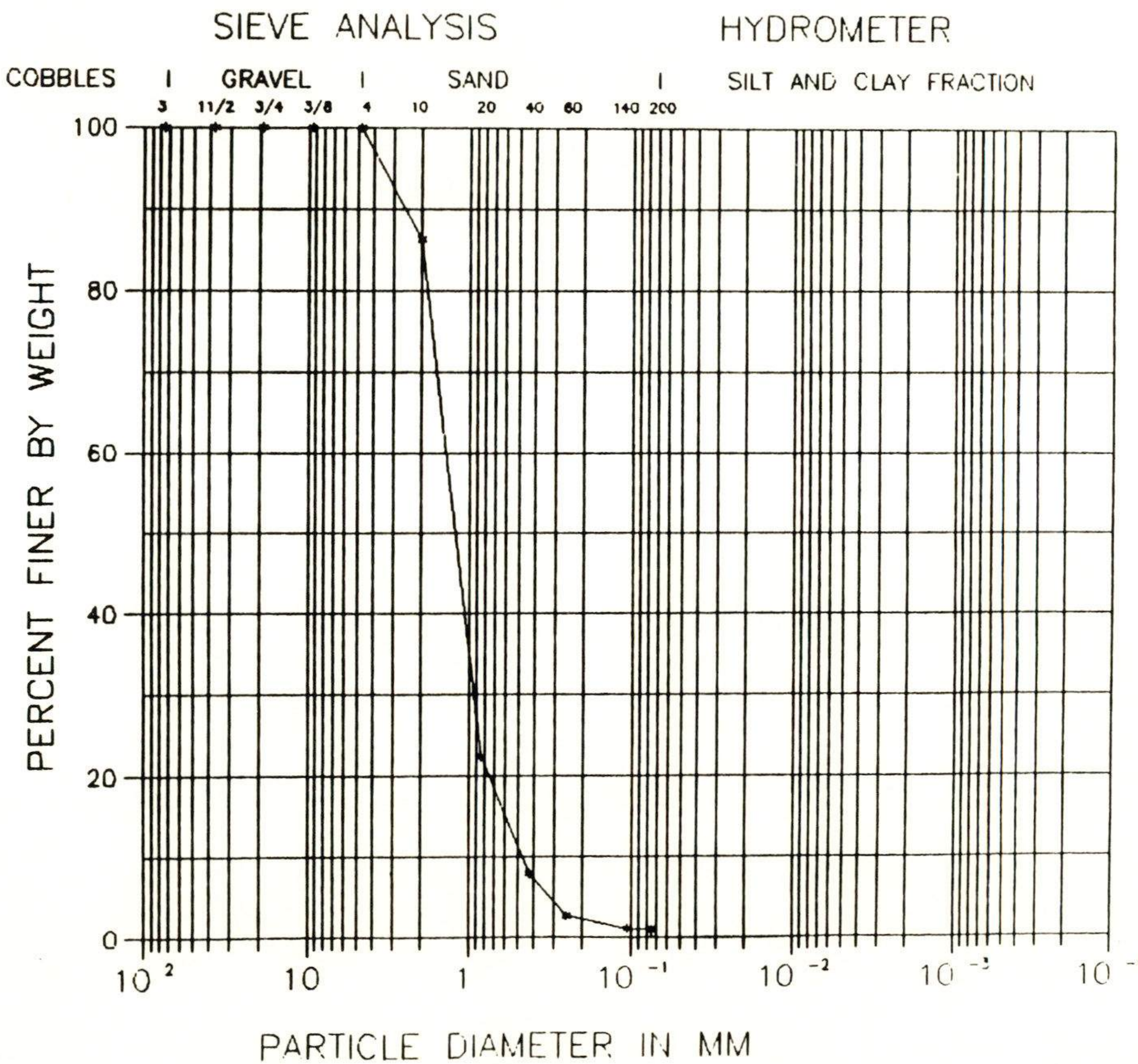
Water Content

Tare No.	673
Wgt. Tare + WS	495.79
Wgt. Tare + DS	493.12
Wgt. Tare	73.13
Wgt. Of Water	2.67
Wgt. Of DS.	419.99

% Water 0.6

CLIENT: IT CORPORATION
PROJECT NO. 89215
DEPTH (FT.): NA
DESCRIPTION: GRAYISH WHITE POORLY GRADED SAND
USCS CLASSIFICATION SP

CLIENT PROJECT: PPG NATRIUM
BORING NO. MW-104
SAMPLE NO. NA



APPENDIX D

LABORATORY ANALYTICAL RESULTS

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation/PPG Natrium
2790 Mosside Boulevard
Monroeville, PA 15146
Attn: B. Halden

November 20, 1989

Job Number: P910218

The Certificate of Analysis is for the following:

Client Project ID: 30~~2~~3409
Date Received by Lab: 10/19/89
Number of Samples: Fourteen
Sample Type: Water

I. Introduction

On October 19, 1989, fourteen water samples were received at ITAS Pittsburgh, labeled as follows:

MW-32	MW-103	MW-105	MW-118	MW-120
MW-101	MW-104	MW-110	MW-118R	Trip Blank 10/18/89
MW-102	MW-104-2	MW-111	MW-119	

II. Analytical Results/Methodology

Results are presented in the enclosed tables and were determined in accordance with recommended analytical procedures.

Results are based on sample concentration and expressed in milligrams per liter or parts per million and micrograms per liter or parts per billion. ND denotes that the compound is not detected at or above the indicated detection limit. Duplicate results indicate duplicate analyses.

III. Quality Control

QA/QC information can be found immediately following the analytical data.

Reviewed and Approved:

Steven H. Cochenour

Steven H. Cochenour, Project Manager

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910218

Method Reference:

Sample Preparation, Water	Environmental Protection Agency, Contract Laboratory Program, Statement of Work No. 787, Section IV, Exhibit-D, Part A, July, 1988.
Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Waste	Method 200.7, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Arsenic (Atomic Absorption, Furnace Technique)	Method 206.2, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Selenium (Atomic Absorption, Furnace Technique)	Method 270.2, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Mercury (Manual Cold Vapor Technique)	Method 245.1, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Total Organic Carbon	Method 9060, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986.
Total Organic Halides	Method 9020, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986.
Gas Chromatograph/ Mass Spectrometry for Volatile Organics	Method 8240, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986.
Gas Chromatograph/ Mass Spectrometry for Semivolatile Organics: Capillary Column Technique	Method 8270, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986.

Method Reference:

Sample Preparation, Water	Environmental Protection Agency, Contract Laboratory Program, Statement of Work No. 787, Section IV, Exhibit-D, Part A, July, 1988.
Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Waste	Method 200.7, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Arsenic (Atomic Absorption, Furnace Technique)	Method 206.2, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Selenium (Atomic Absorption, Furnace Technique)	Method 270.2, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Mercury (Manual Cold Vapor Technique)	Method 245.1, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Total Organic Carbon	Method 9060, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986.
Total Organic Halides	Method 9020, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986.
Gas Chromatograph/ Mass Spectrometry for Volatile Organics	Method 8240, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986.
Gas Chromatograph/ Mass Spectrometry for Semivolatile Organics: Capillary Column Technique	Method 8270, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986.

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910218

Total Organic Carbon Analysis

Client Sample ID: See Below
Sample Date: 10/18/89
Analysis Date: TOC: 11/6/89
TOX: 10/31/89

Client Sample ID:	Total Organic Carbon	Total Organic Halides
	Concentration mg/L	
MW-103	7/7	0.09/0.09
MW-104	5/5	0.06/ND0.05
MW-104-2	5/5	0.07/0.06
MW-105	9/9	ND0.05/ND0.05

	Total Organic Halides Matrix Spike Percent Recovery
MW-104	107%/108%

682-1-89

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910218

Total Metals Analysis

Client Sample ID: MW-101
Sample Date: 10/18/89
Analysis Date: 11/8/89

Parameter	Concentration mg/L	Analtyical Spike Percent Recovery
Arsenic	0.01	100%
Cadmium	ND0.005	--
Chromium	0.32	--

Client Sample ID: MW-102
Sample Date: 10/18/89
Analysis Date: 11/8/89

Parameter	Concentration mg/L
Arsenic	0.03
Cadmium	ND0.005
Chromium	0.37

Client Sample ID: MW-103
Sample Date: 10/18/89
Analysis Date: 11/8,9/89
Mercury: 11/3/89

Parameter	Concentration mg/L	Matrix Spike Percent Recovery
Arsenic	0.14	--
Barium	0.4	--
Chromium	0.16	--
Iron	250	--
Lead	0.65	--
Mercury	0.0041/0.0045	118%
Selenium	ND0.005	--

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910218

Total Metals Analysis

Client Sample ID: MW-104
Sample Date: 10/18/89
Analysis Date: 11/8,9/89
Mercury: 11/3/89

Parameter	Concentration mg/L
Arsenic	ND0.1
Barium	17
Chromium	0.65
Iron	1400
Lead	1.0
Mercury	ND0.0005
Selenium	ND0.005

Client Sample ID: MW-104-2
Sample Date: 10/18/89
Analysis Date: 11/8,13/89
Mercury: 11/3/89

Parameter	Concentration mg/L
Arsenic	ND0.1
Barium	18
Chromium	1.3
Iron	1800
Lead	2.0
Mercury	0.0008
Selenium	ND0.005

Total Metals Analysis

Client Sample ID: MW-105
Sample Date: 10/18/89
Analysis Date: 11/8,13/89
Mercury: 11/3/89

Parameter	Concentration mg/L	Analytical Spike Percent Recovery
Arsenic	0.15	--
Barium	3.4	103%
Chromium	0.3	108%
Iron	420	104%
Lead	0.9	106%
Mercury	0.0012	--
Selenium	ND0.005	--

Client Sample ID: MW-110
Sample Date: 10/18/89
Analysis Date: 11/13/89

Parameter	Concentration mg/L
Lead	0.35

Client Sample ID: MW-111
Sample Date: 10/18/89
Analysis Date: 11/13/89

Parameter	Concentration mg/L
Lead	0.13

Client Sample ID: MW-118
Sample Date: 10/18/89
Analysis Date: 11/8/89

Parameter	Concentration mg/L
Mercury	0.21

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910218

Total Metals Analysis

Client Sample ID: MW-118R
Sample Date: 10/18/89
Analysis Date: 11/3/89

Parameter	Concentration mg/L
Mercury	0.0012

Client Sample ID: MW-119
Sample Date: 10/18/89
Analysis Date: 11/8/89

Parameter	Concentration mg/L
Mercury	0.43

Client Sample ID: MW-120
Sample Date: 10/18/89
Analysis Date: 11/8/89

Parameter	Concentration mg/L
Mercury	0.31

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910218

Total Metals Analysis

Lab Sample ID: Prep Blank (10-25-3)
Analysis Date: 11/8,9/89
Mercury: 11/3/89

Parameter	Concentration mg/L
Barium	ND0.2
Cadmium	ND0.005
Chromium	ND0.01
Iron	ND0.1
Lead	ND0.05

Lab Sample ID: Prep Blank (10-25-4)
Analysis Date: 11/8/89

Parameter	Concentration mg/L
Arsenic	ND0.01
Selenium	ND0.005

Lab Sample ID: Prep Blank #3
Analysis Date: 11/13/89

Parameter	Concentration mg/L
Mercury	ND0.0002

Lab Sample ID: Prep Blank #5
Analysis Date: 11/13/89

Parameter	Concentration mg/L
Mercury	ND0.0002

Selected Volatile Organic Compounds

Client Sample ID: MW-32
Sample Date: 10/18/89
Analysis Date: 10/29/89

Parameter	Concentration µg/L
Methylene Chloride	ND5
Chloroform	ND5
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	ND5
Trichloroethylene	ND5
Benzene	ND5
Tetrachloroethylene	ND5
Chlorobenzene	ND5
o-Dichlorobenzene	ND50
m-Dichlorobenzene	ND50
p-Dichlorobenzene	ND50

Client Sample ID: MW-101
Sample Date: 10/18/89
Analysis Date: 10/30/89

Parameter	Concentration µg/L
Methylene Chloride	ND50
Chloroform	1500
1,1,1,-Trichloroethane	ND50
Carbon Tetrachloride	ND50
Trichloroethylene	ND50
Benzene	ND50
Tetrachloroethylene	140
Chlorobenzene	410

Client Sample ID: MW-102
Sample Date: 10/18/89
Analysis Date: 10/30/89

Parameter	Concentration µg/L
Methylene Chloride	ND100
Chloroform	1600
1,1,1,-Trichloroethane	ND100
Carbon Tetrachloride	ND100
Trichloroethylene	750
Benzene	ND100
Tetrachloroethylene	200
Chlorobenzene	300

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: ~~302409~~ 303409

Job Number: P910218

Selected Volatile Organic Compounds

Client Sample ID: MW-110
Sample Date: 10/18/89
Analysis Date: 10/30/89

Parameter	Concentration µg/L
Chloroform	2600
Carbontetrachloride	ND100
Trans-1,2-dichloroethylene	110
Bromodichloromethane	ND100
Trichloroethylene	110
Tetrachloroethylene	430
Benzene	ND100

Client Sample ID: MW-111
Sample Date: 10/18/89
Analysis Date: 10/30/89

Parameter	Concentration µg/L
Chloroform	ND5
Carbontetrachloride	ND5
Trans-1,2-dichloroethylene	ND5
Bromodichloromethane	ND5
Trichloroethylene	ND5
Tetrachloroethylene	ND5
Benzene	ND5

682 ' 89

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910218

Selected Volatile Organic Compounds

Client Sample ID: Trip Blank 10/18/89
Sample Date: 11/18/89
Analysis Date: 10/29/89

Parameter	Concentration µg/L
Methylene Chloride	ND5
Chloroform	ND5
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	ND5
Trichloroethylene	ND5
Benzene	ND5
Tetrachloroethylene	ND5
Chlorobenzene	ND5
o-Dichlorobenzene	ND50
m-Dichlorobenzene	ND50
p-Dichlorobenzene	ND50

Lab Sample ID: Method Blank 2
Analysis Date: 10/29/89

Parameter	Concentration µg/L
Trans-1,2-dichloroethylene	ND5
Bromodichloromethane	ND5
Methylene Chloride	ND5
Chloroform	ND5
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	ND5
Trichloroethylene	ND5
Benzene	ND5
Tetrachloroethylene	ND5
Chlorobenzene	ND5
o-Dichlorobenzene	ND50
m-Dichlorobenzene	ND50
p-Dichlorobenzene	ND50

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P910218

Selected Volatile Organic Compounds

Lab Sample ID: Method Blank 5
Analysis Date: 10/30/89

Parameter	Concentration µg/L
Trans-1,2-dichloroethylene	ND5
Bromodichloromethane	ND5
Methylene Chloride	ND5
Chloroform	ND5
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	ND5
Trichloroethylene	ND5
Benzene	ND5
Tetrachloroethylene	ND5
Chlorobenzene	ND5

Lab Sample ID: Method Blank 7
Analysis Date: 10/30/89

Parameter	Concentration µg/L
Trans-1,2-dichloroethylene	ND5
Bromodichloromethane	ND5
Methylene Chloride	ND5
Chloroform	ND5
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	ND5
Trichloroethylene	ND5
Benzene	ND5
Tetrachloroethylene	ND5
Chlorobenzene	ND5

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: ~~302409~~ 303409

Job Number: P910218

Volatile Surrogate Spike Percent Recovery

Client Sample ID:	4-Bromofluorobenzene (86-115%)*	1,2-Dichloroethane-d_4 (76-114%)	Toluene-d_8 (88-110%)
MW-32	89%	90%	102%
MW-101	89%	92%	90%
MW-102	93%	86%	92%
MW-110	89%	89%	88%
MW-111	101%	97%	102%
Trip Blank 10-18-89	91%	88%	102%
Method Blank 2	90%	94%	104%
Method Blank 5	88%	91%	95%
Method Blank 7	101%	100%	99%

*Values in parenthesis represent USEPA Contract required QC limits.

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910218

Selected Semivolatile Organic Compounds

Lab Sample ID: MW-101
Sample Date: 10/18/89
Extraction Date: 10/24/89
Analysis Date: 10/27/89

Parameter	Concentration µg/L
1,2,4-Trichlorobenzene	64
Benzo(a)anthracene	ND20
Benzo(b)anthracene	ND20
Benzo(a)pyrene	ND20
2-Chloronaphthalene	ND20
1,2-Dichlorobenzene	260
1,3-Dichlorobenzene	ND20
1,4-Dichlorobenzene	180
7,12-Dimethylbenz(a)anthracene	ND100
3-Methylcholranthrene	ND100
Naphthalene	ND20
Dibenzo(a,h)anthracene	ND20
Fluoranthene	ND20

Lab Sample ID: MW-102
Sample Date: 10/18/89
Extraction Date: 10/24/89
Analysis Date: 10/27/89

Parameter	Concentration µg/L
1,2,4-Trichlorobenzene	230
Benzo(a)anthracene	ND200
Benzo(b)anthracene	ND200
Benzo(a)pyrene	ND200
2-Chloronaphthalene	ND200
1,2-Dichlorobenzene	2000
1,3-Dichlorobenzene	ND200
1,4-Dichlorobenzene	2000
7,12-Dimethylbenz(a)anthracene	ND1000
3-Methylcholranthrene	ND1000
Naphthalene	ND200
Dibenzo(a,h)anthracene	ND200
Fluoranthene	ND200

PPG Natrium
Date: 11/20/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 303409

Job Number: P910218

Selected Semivolatile Organic Compounds

Lab Sample ID: Method Blank
Extraction Date: 10/24/89
Analysis Date: 10/26/89

Parameter	Concentration µg/L
1,2,4-Trichlorobenzene	ND10
Benzo(a)anthracene	ND10
Benzo(b)anthracene	ND10
Benzo(a)pyrene	ND10
2-Chloronaphthalene	ND10
1,2-Dichlorobenzene	ND10
1,3-Dichlorobenzene	ND10
1,4-Dichlorobenzene	ND10
7,12-Dimethylbenz(a)anthracene	ND50
3-Methylcholranthrene	ND50
Naphthalene	ND10
Dibenzo(a,h)anthracene	ND10
Fluoranthene	ND10

682-1-89

PPG Natrium
Date: 11/20/89

Client Project ID: 30~~2~~3409

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Job Number: P910218

Semivolatile Organic Percent Recovery

Client Sample ID:	2-Fluorobiphenyl (43-116%)*	Nitrobenzene-d_5 (35-114%)	Terphenyl-d_{14} (33-141%)
MW-101	78%	70%	48%
MW-102	75%	81%	39%
Method Blank 10/24/89	68%	64%	90%

*Values in parenthesis represent USEPA Contract required QC limits.

682-1-89

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation/PPG Natrium
2790 Mosside Boulevard
Monroeville, PA 15146
Attn: B. Halden

November 15, 1989

Job Number: P910192

The Certificate of Analysis is for the following:

Client Project ID: 30~~2~~3409
Date Received by Lab: 10/17/89
Number of Samples: Fourteen
Sample Type: Water

I. Introduction

On October 17, 1989, fourteen water samples were received at ITAS Pittsburgh, labeled as follows:

MW-5	MW-107	MW-112	MW-114-2	MW-117
MW-100	MW-108	MW-113	MW-115	Trip Blank 10/15/89
MW-106	MW-109	MW-114	MW-116	

II. Analytical Results/Methodology

Results are presented in the enclosed tables and were determined in accordance with recommended analytical procedures.

Results are based on sample concentration and expressed in milligrams per liter or parts per million and micrograms per liter or parts per billion. ND denotes that the compound is not detected at or above the indicated detection limit. Duplicate results indicate duplicate analyses.

III. Quality Control

QA/QC information can be found immediately following the analytical data.

Reviewed and Approved:

Steven H. Cochenour

Steven H. Cochenour, Project Manager

Method Reference:

Sample Preparation, Water	Environmental Protection Agency, Contract Laboratory Program, Statement of Work No. 787, Section IV, Exhibit-D, Part A, July, 1988.
Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Waste	Method 200.7, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Arsenic (Atomic Absorption, Furnace Technique)	Method 206.2, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Alkalinity	Method 403, Standard Methods for the Examination of Water and Wastewater, American Public Health Association, 16th Edition, 1985.
Sulfate, (Turbidimetric)	Method 375.4, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
pH (electrometric)	Method 150.1, Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, 600/4-79-020, 1983 revision.
Total Organic Carbon	Method 9060, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986.

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910192

General Chemistry Analysis

Client Sample ID: See Below
Sampled By: CP/DS
Sample Date: 11/16,17/89
Analysis Date: 10/17,19; 11/1/89

Client Sample ID:	pH --	Alkalinity mg/L	Sulfate mg/L
MW-112	5.47/5.46	6	480
MW-113	5.80	12	120
MW-114	6.26	130/140	140
MW-114-2	6.30	140	150
MW-115	12.09	2000/2000	2
MW-116	8.77	200	69

	Alkalinity Matrix Spike Percent Recovery
MW-115	98%
MW-116	97%

682 1-89

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P910192

Total Organic Carbon Analysis

Client Sample ID: See Below
Sampled By: CP/DS
Sample Date: 11/17/89
Analysis Date: 11/4/89

Client Sample ID:	Total Organic Carbon mg/L
MW-106	7/7
MW-107	4/4
MW-108	6/6
MW-109	4/4

	Matrix Spike Percent Recovery
MW-109	104%/105%

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910192

Total Metals Analysis

Client Sample ID: See Below
Sampled By: CP/DS
Sample Date: 11/16,17/89
Analysis Date: 10/31/89

Client Sample ID:	Arsenic	Cadmium Concentration mg/L	Chromium
MW-5	ND0.01	0.023	0.05
MW-100	ND0.01/ND0.01	ND0.005	0.03
Method Blank	ND0.01	ND0.005	ND0.01

Client Sample ID:	Barium	Iron Concentration mg/L	Lead
MW-106	23	--	1.1
MW-107	12	--	0.51
MW-108	18	--	1.7
MW-109	13	--	0.89
MW-112	1.3	160	--
MW-113	0.3	50	--
MW-114	1.3	160	--
MW-114-2	1.2	170	--
MW-115	0.9	5.7	--
MW-116	3.9	470	--
Method Blank	ND0.2	ND0.1	ND0.05

682 1-89

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910192

Total Metals Percent Recovery

Client Sample ID:	Parameter	Analytical Spike Percent Recovery	Matrix Spike Percent Recovery
MW-107	Barium	104%	--
MW-107	Lead	96%	--
MW-100	Arsenic	91%	75%

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 30~~2~~3409

Job Number: P910192

Selected ·olatile Organic Compounds

Client Sample ID: MW-5
Sampled By: CD/DS
Sample Date: 11/17/89
Analysis Date: 10/30/89

Parameter	Concentration µg/L
Methylene Chloride	ND5
Chloroform	ND5
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	ND5
Trichloroethene	44
Benzene	ND5
Tetrachloroethene	8
Chlorobenzene	ND5

Client Sample ID: MW-100
Sampled By: CD/DS
Sample Date: 11/17/89
Analysis Date: 10/30/89

Parameter	Concentration µg/L
Methylene Chloride	ND5
Chloroform	120
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	15
Trichloroethene	60
Benzene	ND5
Tetrachloroethene	200
Chlorobenzene	ND5

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P910192

Selected Volatile Organic Compounds

Client Sample ID: MW-106
Sampled By: CD/DS
Sample Date: 11/17/89
Analysis Date: 10/28/89

Parameter	Concentration µg/L
Carbon Tetrachloride	ND5
Benzene	ND5

Client Sample ID: MW-107
Sampled By: CD/DS
Sample Date: 11/17/89
Analysis Date: 10/30/89

Parameter	Concentration µg/L
Carbon Tetrachloride	ND5
Benzene	ND5

Client Sample ID: MW-108
Sampled By: CD/DS
Sample Date: 11/17/89
Analysis Date: 10/29/89

Parameter	Concentration µg/L
Carbon Tetrachloride	ND5
Benzene	ND5

Client Sample ID: MW-109
Sampled By: CD/DS
Sample Date: 11/17/89
Analysis Date: 10/29/89

Parameter	Concentration µg/L
Carbon Tetrachloride	ND5
Benzene	ND5

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P910192

Selected Volatile Organic Compounds

Client Sample ID: MW-117
Sampled By: CD/DS
Sample Date: 11/17/89
Analysis Date: 10/29/89

Parameter	Concentration µg/L
Methylene Chloride	ND5
Chloroform	ND5
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	ND5
Trichloroethene	27
Benzene	ND5
Tetrachloroethene	32
Chlorobenzene	ND5
1,2-Dichlorobenzene	ND10
1,3-Dichlorobenzene	ND10
1,4-Dichlorobenzene	ND10

Client Sample ID: Trip Blank 10/15/89
Sampled By: CD/DS
Sample Date: 11/15/89
Analysis Date: 10/29/89

Parameter	Concentration µg/L
Methylene Chloride	ND5
Chloroform	ND5
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	ND5
Trichloroethene	ND5
Benzene	ND5
Tetrachloroethene	ND5
Chlorobenzene	ND5
1,2-Dichlorobenzene	ND10
1,3-Dichlorobenzene	ND10
1,4-Dichlorobenzene	ND10

682 1 89

Selected Volatile Organic Compounds

Lab Sample ID: Method Blank
Analysis Date: 10/28/89

Parameter	Concentration $\mu g/L$
Methylene Chloride	ND5
Chloroform	ND5
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	ND5
Trichloroethene	ND5
Benzene	ND5
Tetrachloroethene	ND5
Chlorobenzene	ND5
1,2-Dichlorobenzene	ND10
1,3-Dichlorobenzene	ND10
1,4-Dichlorobenzene	ND10

Lab Sample ID: Method Blank
Analysis Date: 10/29/89

Parameter	Concentration $\mu g/L$
Methylene Chloride	ND5
Chloroform	ND5
1,1,1,-Trichloroethane	ND5
Carbon Tetrachloride	ND5
Trichloroethene	ND5
Benzene	ND5
Tetrachloroethene	ND5
Chlorobenzene	ND5

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P910192

Volatile Surrogate Spike Percent Recovery

Client Sample ID:	4-Bromofluorobenzene (86-115%)*	1,2-Dichloroethane-d_4 (76-114%)	Toluene-d_8 (88-110%)
MW-5	101%	108%	108%
MW-100	99%	104%	108%
MW-106	93%	91%	97%
MW-107	106%	94%	98%
MW-108	88%	92%	104%
MW-109	92%	94%	102%
MW-117	90%	91%	102%
Trip Blank 10/15/89	90%	92%	102%
Method Blank 10/28/89	103%	100%	104%
Method Blank 10/29/89	90%	94%	104%

*Values in parenthesis represent USEPA Contract required QC limits.

582 · 69

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P910192

Selected Semivolatile Organic Compounds

Client Sample ID: MW-5
Sampled By: CD/DS
Sample Date: 11/17/89
Analysis Date: 10/26/89

Parameter	Concentration µg/L
1,2,4-Trichlorobenzene	ND10
Benzo(a)Anthracene	ND10
Benzo(b)Fluoranthene	ND10
Benzo(a)Pyrene	ND10
2-Chloronaphthalene	ND10
7,12-Dimethylbenz(a)Anthracene	ND10
3-Methylchloranthrene	ND10
1,2-Dichlorobenzene	ND10
1,3-Dichlorobenzene	ND10
1,4-Dichlorobenzene	ND10
Naphthalene	ND10
Dibenzo(a,h)anthracene	ND10
Fluoranthene	ND10

Client Sample ID: MW-100
Sampled By: CD/DS
Sample Date: 11/17/89
Analysis Date: 10/26/89

Parameter	Concentration µg/L
1,2,4-Trichlorobenzene	ND10
Benzo(a)Anthracene	ND10
Benzo(b)Fluoranthene	ND10
Benzo(a)Pyrene	ND10
2-Chloronaphthalene	ND10
7,12-Dimethylbenz(a)Anthracene	ND10
3-Methylchloranthrene	ND10
1,2-Dichlorobenzene	ND10
1,3-Dichlorobenzene	ND10
1,4-Dichlorobenzene	13
Naphthalene	ND10
Dibenzo(a,h)anthracene	ND10
Fluoranthene	ND10

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P910192

Selected Semivolatile Organic Compounds

Lab Sample ID: Method Blank
Analysis Date: 10/23/89

Parameter	Concentration µg/L
1,2,4-Trichlorobenzene	ND10
Benzo(a)Anthracene	ND10
Benzo(b)Fluoranthene	ND10
Benzo(a)Pyrene	ND10
2-Chloronaphthalene	ND10
7,12-Dimethylbenz(a)Anthracene	ND10
3-Methylchloranthrene	ND10
1,2-Dichlorobenzene	ND10
1,3-Dichlorobenzene	ND10
1,4-Dichlorobenzene	ND10
Naphthalene	ND10
Dibenzo(a,h)anthracene	ND10
Fluoranthene	ND10

PPG Natrium
Date: 11/15/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P910192

Semivolatile Organic Percent Recovery

Client Sample ID:	2-Fluorobiphenyl (43-116%)*	Nitrobenzene-d_5 (35-114%)	Terphenyl-d_{14} (33-141%)
MW-5	83%	72%	55%
MW-100	79%	64%	37%
Method Blank 10/23/89	85%	77%	87%

*Values in parenthesis represent USEPA Contract required QC limits.

682 1-89

INTERNATIONAL
TECHNOLOGY
CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation/PPG Natrium
2790 Mosside Blvd.
Monroeville, PA 15146
Attn: Joe Burdick

October 24, 1989

Job Number: P910213

The Certificate of Analysis is for the following:

Client Project ID: 30~~2~~3409
Date Received by Lab: 10/19/89
Number of Samples: Five
Sample Type: Soil

I. Introduction

On October 19, 1989, five soil samples were received at ITAS Pittsburgh, labeled as follows:

SB101 7-9' MW-121 7-9'
SB102 6-8' MW-122 7-9'
SB103 7-9'

II. Analytical Results/Methodology

Results are presented in the enclosed table and were determined in accordance with Method 9045, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986.

Reviewed and Approved:

Steven H. Cochenour, Project Manager

PPG, Natrium
Date: 10/24/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P910213

Geo-Chemical Analysis

Analysis Date: 10/23/89

Client Sample ID:	1:1 pH
SB101 7-9'	5.75/5.60
SB102 6-8'	5.30
SB103 7-9'	5.80
MW-121 7-9'	6.40
MW-122 7-9'	5.30

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation/PPG Natrium
2790 Mosside Blvd.
Monroeville, PA 15146
Attn: Bob Haldin

October 18, 1989

Job Number: P909219

The Certificate of Analysis is for the following:

Client Project ID: 302409
Date Received by Lab: 9/27/89
Number of Samples: Two
Sample Type: Soil

I. Introduction

On September 27, 1989, two soil samples were received at ITAS Pittsburgh, labeled as follows:

MW-118-01
MW-118-02

II. Analytical Results/Methodology

Results are presented in the enclosed table and were determined in accordance with Method 7471, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986 (Manual Cold Vapor Technique).

Results are based on sample concentration and expressed in milligrams per kilogram or parts per million. ND denotes that the compound is not detected at or above the indicated detection limit.

III. Quality Control

QA/QC information can be found immediately following the analytical data.

Reviewed and Approved:

Steven H. Cochenour, Project Manager

PPG, Natrium
Date: 10/18/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P909219

Mercury Analysis

Client Sample ID: See Below
Sample Date: 9/26/89
Analysis Date: 9/28; 10/17/89

Client Sample ID:	Mercury mg/Kg
MW-118-01	130/220/1900 *
MW-118-02	0.7
Preparation Blank #1	ND0.1
Preparation Blank #2	ND0.1

	Matrix Spike Percent Recovery
MW-118-01	250%/0% **

*Due to the nature of the sample (a high concentration of sample versus the small amount needed for analysis) an acceptable percent RSD could not be achieved for the duplicate digestion; therefore, all values obtained are reported. The sample was prepared and analyzed on two separate days.

**The sample concentration was greater than four times the spike concentration.

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation/PPG Natrium
2790 Mosside Blvd.
Monroeville, PA 15146
Attn: Bob Haldin

October 11, 1989

Job Number: P909192

The Certificate of Analysis is for the following:

Client Project ID: 30~~2~~3409
Date Received by Lab: 9/22/89
Number of Samples: Seven (7)
Sample Type: Soil

I. Introduction

On September 22, 1989, seven soil samples were received at ITAS Pittsburgh, labeled as follows:

MW-119-01	MW-120-01	SS-1
MW-119-02	MW-120-02	SS-2
		SS-3

II. Analytical Results/Methodology

Results are presented in the enclosed table and were determined in accordance with Method 7471, Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, 1986. (Manual Cold Vapor Technique)

Results are based on sample concentration and expressed in milligrams per kilogram or parts per million. ND denotes that the compound is not detected at or above the indicated detection limit.

III. Quality Control

QA/QC information can be found immediately following the analytical data.

Reviewed and Approved:

Steven H. Cochenour

Steven H. Cochenour, Project Manager

PPG, Natrium
Date: 10/11/89

IT ANALYTICAL SERVICES
PITTSBURGH, PA

Client Project ID: 302409

Job Number: P909192

Mercury Analysis

Client Sample ID: See Below
Sample Date: 9/20,21,22/89
Analysis Date: 9/27,28/89

Client Sample ID:	Mercury mg/Kg
MW-119-01	130
MW-119-02	0.3
MW-120-01	0.1
MW-120-02	ND0.1
SS-1	90
SS-2	7.1
SS-3	11/10
Preparation Blank #1	ND0.1
Preparation Blank #2 9/27/89)	ND0.1
Preparation Blank #2 9/28/89	ND0.1

	Matrix Spike Percent Recovery
SS-3	527%/0% *

*The sample concentration was greater than four times the spike concentration.